THE METAL INDUSTRY
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THE ALUMINUM WORLD, THE BRASS FOUNDER AND FINISHER AND ELECTRO-PLATERS REVIEW
A TRADE JOURNAL RELATING TO THE NON-FERROUS METALS AND ALLOYS.

OLD SERIES
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NEW SERIES
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HOW TO MAKE A NEW ALLOY.

By Ernest A. Lewis, Birmingham, England.

It often happens that a manufacturer is sent a sample of an alloy and is asked to make it. The object of this paper is to show that it can easily be done with the aid of scientific metallurgy. The first thing to do is to get an accurate and reliable analysis made by an experienced chemist. Having got this, a good metallurgist can easily make experiments with a view to making the alloy. If the manufacturer has his own laboratory fitted up for metallurgical experiments with melting furnaces, etc., his chemist should be able to make the preliminary experiments.

ERNEST A. LEWIS.

I may say at once that if a constituent does not occur in quantity over 0.05 per cent., it has nothing to do with the properties of the alloy, and it is not intentionally put in. The only exception to this may possibly be phosphorus.

Take, for instance, the case of a brass rolling mill who have a sample rod sent them to match; it gives a high tensile strength, forges well at a low red heat and is said to resist corrosion.

It is sent for analysis and the following is the result:

Copper	=	57.25	per cent.
Zinc	=	40.35	" "
Lead	=	.15	" "
Tin	=	1.00	" "
Iron	=	.20	" "
Manganese	=	.80	" "
Aluminum	=	.25	" "
		100.00	" "

The alloy is evidently a manganese bronze. It is lower in copper than yellow metal and will not stand the same heat for rolling, and must be cast at a lower temperature.

The next question is how is it made? There is every probability that the manganese was added as cupro-manganese; it could not be easily added as ferro-manganese or as metallic manganese, owing to their high melting points. Another constituent is the aluminum. In this class of alloy it acts as a reducing agent—that is, a deoxidizer and assists the metals to alloy better. It is probably added as metallic aluminum, or a rich cupro-aluminum, containing 50 per cent. copper and 50 per cent. aluminum. Another constituent is the tin. Why is it added and how? It has been found that the addition of tin aids this type of alloy to resist corrosion. It can be added either as metallic tin or copper tin alloy. A few trials will show the best method. Another constituent is iron. As it is only present in quantity of 0.2 per cent., it may safely be assumed it is an impurity in the cupro-manganese. Lastly, there is the small percentage of lead. The quantity tells a very important thing. It is known that when lead is added to a brass alloy it weakens it and also causes it to turn easily; when it is purposely added for this purpose for screwing metal, it is generally present in quantity of 1 per cent. The smallness of the quantity present in this alloy shows it to be made from a very high-grade spelter. If it was attempted to make the alloy from ordinary spelter, failure would be the result. You could not get a high tensile strength.

Now having carefully thought over all the possible points in the analysis, we proceed to make a few small trials of the alloy, previous to making a large trial. These preliminary trials are best carried out in a small plumbago crucible, holding about 10 pounds of metal, and cast into a small strip mould of a convenient size, the resulting strip weighing about 7 pounds. These strips are big enough for rolling.

For these trials a small pair of scales to weigh up to 10 pounds and gramme weights are very useful. Suppose each trial weighs 5,000 grammes, multiply all the percentages of constituents present by 50 to get the number of grammes to be weighed out. Add the small percentage of impurity to the metal it is probably present in.

Copper	=	2,862.5	grammes
Spelter	=	2,025.0	"
(+ 1% for loss = 2,045 grammes)			
Ferro-manganese	=	50.0	"
Aluminum	=	12.5	"
Tin	=	50.0	"
		5,000.0	

If one uses an alloy of cupro-manganese containing 20 per cent. manganese and 5 per cent. iron to get 50 grammes iron and manganese 200 grammes, cupro-manganese must be taken. This contains 150 grammes copper, which must be deducted from the copper weighed out. If the aluminum and tin are added as alloys of copper, the weight of copper present must also be deducted; 1 per cent. spelter should be added to allow for loss. For these experimental casts electrolytic cathodes cut up into convenient sizes with shears are the best to use, and spelter of 99.5 per cent. purity, cast into thin sticks.

Melt the copper first, then add the cupro-manganese, then spelter, and lastly add the tin and aluminum; stir well, and cover well with fine charcoal and get

warm, but not boiling. Remove from furnace, skim the metal clean and pour at a moderate heat into the mould, previously oiled and dusted with charcoal, and warmed. Having cast three or four experimental plates, take them to the rolling mill, roll one at a black heat, another at a dull red, and another at a bright red. Let them cool and observe which rolls the best and bends the best cold when hammered up close. It will be found that the trial rolled at a dull red gives the best results.

Having now got a lot of valuable information regarding the alloy, a trial casting on a large scale is made, using 100 pounds of metal. For this test it is best to cast a small bolt and roll it into a rod of 1 inch diameter. A tensile test should then be made of it both after annealing and when cold rolled. The bolt must be rolled at the same temperature as that which gave the best results in the smaller trials.

The next thing after annealing (and it must only be annealed at a dull red heat) is to try and draw it down on a drawbench. In this particular alloy it will be found that if you give the same draft as yellow metal of 62 per cent. copper and 38 per cent. zinc, the rod will have a scaly surface; less draft must be given. With careful annealing and drawing a tensile strength of 42 tons per square inch and 20 per cent. elongation can be obtained with this alloy.

By experimental casts like the above any alloy can be matched to any given sample. With alloys which will not roll hot, experiments must be made by cold rolling or drawing. Composition ingot metals can easily be made to a given sample. When an alloy contains nickel it is always best to add it as cupro-nickel; this of course does not refer to German silver.

By working on similar lines to the above I have discovered how to forge brass containing 70 per cent. copper and 30 per cent. zinc at a bright red heat. It was known that the reason 70/30 brass would not roll hot was owing to the lead which is present in ordinary spelter separating out at a red heat in the free state and melting, and caused the metal to crack. I tried using electrolytic copper and electrolytic zinc, but the metal would not roll. After numerous trials I found it was necessary to have 0.5 per cent. manganese present. The alloy containing copper 70 per cent., zinc 29½ per cent. and manganese ½ per cent. will roll hot quite easily, provided it is made from electrolytic copper and spelter. The only difficulty is the high price of the metals renders it useless for commercial purposes.

STANDARD GOVERNMENT ALLOYS.

The following table presents in convenient arrangement the most important copper alloys required in work for the Government navy yards:

Mark.	Copper.	Tin.	Zinc.	Copper.	Tin.	Zinc.	Tensile strength.	Elastic limit.	Elongation in 2 inches.	Reduction of area.	Qualities.	To Be Used For
A.	84	16	2	42	8	1	17,820	17,820	Nil	Nil	Where wear is considerable.	Bearings, bushings, sockets, sheaves in blocks, etc.
B.	86	14	2	43	7	1	17,020	17,020	Nil	Nil	Less hard and brittle.	Guides, guide blocks, valves and plug cocks.
C.	88	10	2	44	5	1	30,360	17,190	20.0	9.8	Tenacious; less hard.	Torpedo tubes, general fittings, plunger cocks, etc.
D.	90	10	2	45	5	1	22,610	15,400	15.5	11.7	Not for frictional wear.	Bolts, nuts, stanchions, wood screws, door hinges.
E.	67	—	33	2	—	1	26,770	7,760	50.0	39.0	Soft; easy to work.	General fittings, drain pipes, cabin fittings, etc.
F.			Scrap				—	—	—	—	Where strength is not wanted.	Deck and name plates, ornaments, etc.
G.	77	23	—	10	3	—	27,180	27,180	Nil	Nil	Bell metal.	Ship bells.
H.	33	—	67	1	—	2	—	—	—	—	Electro-chemical quality of iron.	Special purposes as directed.
I.	60	—	40	3	—	2	47,170	15,110	54.0	46.7	Muntz metal.	

NOTE.—All composition castings are to conform to this schedule. No drawings or patterns to be accepted without a letter designating the composition.

NEW METAL ALLOY.

A new metal alloy which is claimed to be suitable for high and enduring lustre, and to have enduring and permanent qualities, has been patented by Elwood Haynes, of Kokomo, Ind., December 17, 1907. It is stated that this alloy "is capable of being forged, hammered or otherwise worked into various forms of instruments and articles, and which is highly adapted, among other uses, as a substitute for metals which have been heretofore plated in order to provide a suitable lustre and resist the oxidizing and corrosive action of the normal fumes of atmosphere and fumes of abnormal atmosphere occurring in chemical laboratories, manufacturing establishments and like places."

The alloy is of chromium and nickel and may be produced in three different ways. One method consists in placing the pure metals, chromium and nickel, in a magnesia crucible, which is placed in a furnace lined with magnesia and the crucible heated by an oxyhydrogen flame. The metals may be fused in a crucible of similar character and construction heated by an electric arc. The third method of fusing the metals to alloy the same consists in mixing the oxid of chromium with the required proportion of oxid of nickel and thereafter mixing these two oxids intimately with metallic aluminium preferably in the form of powder. Thereafter this mixture is introduced into a crucible lined with magnesia or alumina, and the mixture is either heated until decomposition takes place or is ignited cold and the metals are reduced to the metallic state and at the same time fused to a regulus by the extremely high temperature thus produced.

The alloy is made of more than 30 per cent of chromium, but less than 60 per cent, the remainder being nickel.

The microscope, extending its researches to the examination of the non-ferrous metals, has been directed upon polished and etched sections, of copper, brass, and bronze, and has revealed the varying structures resulting from different degrees of heat in melting and pouring, as well as from forging, rolling, and other mechanical processes.

WANTED—A BRASS FOUNDRY FOREMAN.*

By Jesse L. Jones.

JESSE L. JONES.

The advent of the molding machine into the brass foundry has made a very radical change in labor conditions all over the country. It has also been instrumental in reducing the number of jobbing shops and causing a large increase in the number of specialties foundries, in which certain standard goods are produced and the molder makes the same piece every day, over and over again.

These changes have created a demand for workmen of great muscular strength and endurance rather than for journeyman molders who have spent the usual three or four years' apprenticeship in learning the trade. One hears it remarked everywhere that no one is learning the brass molder's trade any more, and it is no uncommon thing to find brass foundries that employ over one hundred men in which there are not half a dozen journeymen molders and no apprentices at all.

As the signs of the times point to even greater specialization in the future than at the present, the question is being asked by the more far-sighted among our manufacturers, "Where are we to get good foremen in the future?"

(1) The most likely source of good men is the very small country jobbing shops. In the large foundries the foremen are often to be blamed for the scarcity of good molders because, even if apprentices are obtainable, the foremen are so busy getting out production that they do not care to instruct them. In the small shops there is not such a rush to get work out, and the molders and apprentices can get a good all-around knowledge of the trade, which, if they have the proper qualifications, will fit them in time to take hold of the larger shops. It is not likely, however, that the demand for good foremen can be supplied from this course.

(2) The iron foundries have furnished quite a few brass foundry molders and foremen, but they are often men who have left the iron foundries because they were looking for easier work, and, as a rule, they are so possessed by the traditions of the iron foundry that they can never quite forget them.

(3) Many owners and works managers pin their faith to technical graduates from our colleges and manual training schools. Very few of these graduates care to go into the brass foundry and, when they do, they are not likely to meet with much success. A successful foreman must know, from his own skill and experience, the skill and experience requisite for each job and give it to the man best qualified to get it out. He must know how long it will take to get out the work, and his workmen must know that he knows or they will "lay down on him." The technical graduate has not had this practical experience, and it does not take his men long to find it out.

(4) The brass foundry foremen of the past has come up from the ranks, and the only reasonable source from which to look for the brass foundry foreman of the future is among the Slavs, Italians, etc., that operate the molding machines and do the bulk of the work in most of our large brass foundries to-day.

At first sight this may not seem a very promising quarter in which to look for foremen. Most of these men have a very limited education. In the countries from which they come two or three years of school is all most of them get, and this is not throughout the year, but during the summer, as they may be excused during the winter at their parents' request.

Their migratory habits are a great drawback, very few of them bringing their families with them or taking out citizenship papers. Many of them, although making from $4 to $5 per day on piece work, do not live as well here as in their native countries. In some of their boarding houses a bed costs each person 50 cents a month, but this means that it is worked double time, three sleeping in it during the day and three during the night. Food costs $6 per month and upward. The object of many of them, frankly declared, is the saving up of a few thousands of dollars so that they may return to their native countries and enjoy what they call a "dolce far niente" for the rest of their days.

Some one has said that "God takes care of children, fools and the United States," and, while this undoubtedly includes the brass foundries, it would seem advisable for our broad-minded and far-seeing employers of labor to take immediate steps to raise the standard of the foreign labor they employ.

Y. M. C. A. BUILDING AT WILMERDING.

This could be done at once if our brass foundries would resolve to employ (or at least give the preference to) only such foreigners as have declared their intention of becoming citizens of the United States. This would insure a knowledge of the English language, as the United States Statutes at Large, Vol. 34, page 599, requires "That no alien shall hereafter be naturalized or admitted as a citizen of the United States who cannot speak the English language."

Some of the molding machine men in the Pittsburg district are extremely fine specimens of physical manhood, especially noteworthy being those that come from the mountains of Croatia. The Italians from the north of Italy may be mentioned as being extremely bright and enterprising. In several brass foundries they have sought the many blessings and benefits that fall to the lot of the dominant race, and opposite the numbers of their time checks are the names of Dennis Murphy, Tim O'Toole and Pat Flanagan.

*Paper read before the National Association Brass Manufacturers.

At Lyndora, a suburb of Butler, Pa., an undenominational school was organized in February, 1907, which has enrolled 179 men of thirteen different nationalities who are studying English every night in order to become citizens.

The Westinghouse Air Brake Company has spent almost $100,000 on a splendidly equipped Welfare Building at Wilmerding, Pa., where, under the auspices of the Y. M. C. A., many foreigners are enrolled in the evening educational classes.

If the members of this association and the other large employers of foreign labor would unite with the patriotic and philanthropic citizens of the cities in which their works are located and set about providing night schools in which these laborers could learn our tongue, laws and customs, and also the benefits of the American home life, of American citizenship, sobriety and morality, and to spend their money freely in the land where it is earned, the problem of "Wanted—A Brass Foundry Foreman" would soon be solved.

PROGRESS IN ROLLING MILL EQUIPMENT—A CONTINUOUS MILL—AN ELECTRIC MILL.

THE CONTINUOUS MILL.

The greatest progress in rolling mill equipment, or what mill men might term the most radical changes in rolling mill equipment, that has taken place during the past year was undoubtedly the installation and operation of the continuous sheet mill of the Aluminum Company of America, at their New Kensington plant and the electric power equipment of the Buffalo (N. Y.) Copper and Brass Rolling Mill. The Aluminum Company's mill is, as far as known, the only metal rolling plant in the world having a continuous mill, this class of machinery heretofore being confined to the steel and tin plate industry. The Buffalo Company's mill is the only brass copper mill in the world that has not an engine as a part of its equipment. Any other engineless plants have been steel mills, and the aluminum mill at Niagara.

BUFFALO COPPER AND BRASS ROLLING MILL.
From a picture taken by the Buffalo *News*. The mill is now finished and begins to roll metal this month.

THE METAL INDUSTRY has made during the past two months an earnest effort to get a complete technical illustrated description of these new plants, but the unfortunate secrecy which is a tradition of the American metal industry and which pervades many of the factories has prevented our publishing in this issue more than some general facts, mainly commercial, furnished by the respective plants. We can say, however, that we have had the pleasure of inspecting the continuous mill and getting a good view of the outside of the new Buffalo plant.

The continuous mill is a wonderful piece of machinery and replaces a long line of single stand rolls. Its very bigness impresses a visitor as a mighty mechanical mass of rolls and gearing that puts metal rolling on a plane approaching steel rolling in labor saving mainipulation. The mill has been tried out for a number of months and has proven its capacity for doing the work for which it was designed and constructed. We herewith print such particulars as are furnished us by the Aluminum Company of America.

"Our continuous mill is like every other continuous mill in that each stand of rolls is geared to a higher peripheral speed in order to compensate for the increased length and speed of the sheet which has been compressed and consequently lengthened by the preceding roll. This increased speed of the roll is obtained by gearing. The result is that each roll runs to a given amount faster than the preceding roll, which in turn necessitates that the draft on each roll must be just an amount sufficient to lengthen the sheet the required amount. In other words, the speed of the roll is fixed and the length of the sheet must correspond to it and the required length of the sheet is gained by squeezing the rolls together. This of course is a very delicate operation and requires not only considerable skill, but a great deal of practice. The whole question therefore of the continuous mill is whether or not men can be found who can keep the mill running. There is no special novelty about the mill itself. It is just the same as if five mills were put one in front of another. The real novelty is in finding the man that has got the ability to handle it."

"As implied above, our continuous mill is one of five stands, is made by A. Garrison Foundry Company of Pittsburg, Pa., and requires a 1,000 horse power engine to drive it, which was built by the Southwick Iron Company of Philadelphia."

THE ELECTRIC MILL.

The Buffalo mill as cited above represents a remarkable change, inasmuch as it is run without an engine. It uses the electric power of Niagara Falls and is situated in the Black Rock section of Buffalo which is destined to become a great brass and copper manufact-

uring center. Already a new tube concern—the Buffalo Tube Company, manufacturers of small sized tubing—have located in the neighborhood of the new mill and not far away on the Harbor front is the big smelting plant of the Calumet & Hecla Company known as the Buffalo Smelting Works and which plant has recently been greatly enlarged. We herewith print the commercial particulars furnished us by the Buffalo Copper and Brass Rolling Mill.

"The Buffalo Copper & Brass Rolling Mill is now booking orders for sheet copper and is making very attractive prices to the trade. The works will start up the latter part of January with a full force of experienced operators who have had many years of experience in producing sheet copper. It is intended to use nothing but Lake Superior copper in the works, which will assure the finest product possible, the capacity of the mill being 16,000,000 lbs. per annum. It will be electrically driven. The mill is equipped with the latest improved machinery, some being especially designed, which will dispense with a great many high price experts and will reduce the cost of production materially according to experts' opinion in the rolling mill line.

"The mill will be able to produce copper at a much lower figure than any mill in operation at the present time. The main building is 336 ft. by 176 ft. and is composed of steel and brick, of concrete foundation, and is also provided with an industrial railway, electric cranes and compressors for handling material. It is located on the Military Road, on the line of the New York Central, at Black Rock, and has a branch running into the center of the building as well as along the side, for convenience of handling metals, machinery and supplies.

"It is the intention of the management as soon as the copper mill is in the proper running order to produce sheet brass, circles, brass and copper tubing, rods, wire, etc., and it will eventually be one of the largest industries of the city of Buffalo."

THE END OF THE TUBING ASSOCIATION.

The withdrawal of one of the members from the proposed Association of the Manufacturers of small size seamless tubing, mentioned in our November issue, made it impracticable to continue the association, so it has been abandoned. Two months ago an agreement for such an association had been drawn up and all the necessary steps taken excepting the signing of the agreement. The association was to include the majority of the tubing manufacturers in the United States who made small sized brass and copper tubes and was for the protection of members and the sustaining of prices. The withdrawal of the member mentioned ends its affairs for the time being.

NEW METALLIC ALLOY.

A patent granted to F. W. Fletcher, of Helpston, Eng., September 24, 1907, deals with a new metallic alloy intended particularly for shoes for beasts of burden. The alloy is composed of aluminum, gun metal (preferably soft formed from 90 quarts copper and 10 parts of tin) and white metal formed from a mixture of 6 parts tin with 1 part copper admixed with a mixture of 6 parts tin and 1 part antimony in the following proportions:

Aluminum	30	lbs.
Gun metal	1	"
White metal	¼	"

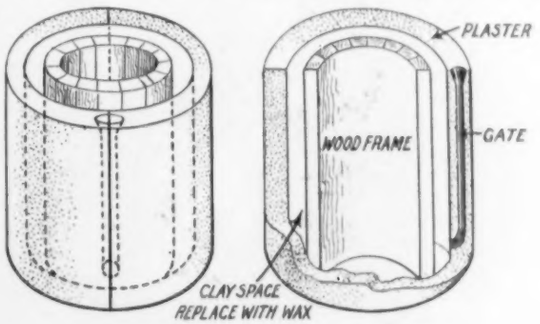
These are melted and thoroughly stirred, and then cast into molds in strip form to form ingots.

THE MAKING OF WAX MANDRELS.

By D. J. Lemal.

The making of wax mandrels for the deposition of large copper cylinders, say up to 30 inches in diameter, is a work requiring some care and experience. In the following I will describe the method I would follow if I had such work to do. In the first place I would condemn the process of building up the paraffine in a soft or non-fluid state, as that renders the wax spongy from the air held captive in it, and the successive applications laminate it; therefore the only way is to cast it.

I would roll a sheet of clay the same thickness that the wax part is to be, and for a 36-inch cylinder the thickness should be about an inch at least, or a little thicker would be better. The sheet of clay should be fastened around the wood frame that the wax is to be applied to. Now we proceed to the making of a plaster mold around the clay; this should be 1½ or 2 inches thick. For convenience sake it should be made in two parts or halves so as to withdraw it easily from the model—the wood frame covered with clay. This plaster mold should be made with a bottom to it, and as the wax should run in from the bottom the gate should be cut at the parting of the mold, as indicated in the sketch. After the plaster is set and mold open the clay is removed, leaving a space for the wax. Before we cast the wax we must take in consideration that paraffine wax



THE MAKING OF WAX MANDRELS.

shrinks a great deal, and in order to prevent this some wire netting should be enclosed in the wax; mosquito netting would answer well. It should be put in about ½ an inch from the wood frame and kept in place by pairs of flat head nails, placed one inside the netting to let the netting rest upon it, and one alongside going through the netting and holding it firmly against the head of the other nail.

Now the mold is made and prepared, but before casting the plaster should be soaked in warm water, almost boiling. The plaster is to be soaked until it cannot take up any more water, which can be seen by the stoppage of air bubbles rising from it. If the mold is only a few hours old it will be soaked enough in 15 minutes; but if several days old it will take an hour or more. The surface water should be blown or sponged off before using, as free water in the mold will produce wrinkles in the wax. The wax should be poured into the gate without stopping after once being started. When filled, as the wax cools and shrinks it will go down in the mold, which should be kept full. It is advisable to make the mold higher than the wax pattern wanted. Let the wax harden well, but not altogether cold, as it may then stick to the mold and be spoiled if another cast is wanted. If the wax piece should have cracks or other defects, patch it up with a heated soldering iron and wax. When cold the piece is ready for the bath.

THE DESIGNER OF MODERN SILVERWARE.

By A. F. Saunders, Designer.

On what depends the charm of the composition of the silversmith? asks Charles Blanc, in one of his books. I would answer, it depends throughout on the proportion. Where the silversmith has fulfilled the three following conditions, he has obeyed the fundamental principle, which is the law of his art: His wares should be convenient to handle, well adapted to their use, and as plain as allowable.

Design forms one of the most interesting as well as important branches of the silverware industry; it is really the trunk out of which grows the finished articles. The designer, while having no set rule to follow, has certain fundamental principles which he must keep in mind, that his wares shall not merely be so-called artistic (a term much misunderstood), but that they shall be well adapted for their use and to the material used in their construction. First of all proportion and practicability should be studied; second, form and a judicious application of ornament. It is always a great temptation to over-do in the matter of decoration, thus spoiling the effect and feeling of refinement of the whole object. The designer to a certain extent allows his imagination to influence him in his creations—that is, he has certain ideals in his mind whch are based on what he considers the beautiful, and thus imagines the finished article before him based on these ideals.

He must have a thorough knowledge of the cost of manufacture, the different processes where machine work can be combined with hand work in such a way that it will not decrease the intrinsic value of the work. Of course there is a percentage of his work in which he is given carte blanche; then it is that he can realize some of his ideals and endeavor to make his creation a thing of beauty and a joy forever. But in this article I am writing of the so-called commercial wares—that is, silverware made for the general trade and in a modern factory where machinery is used when possible.

The first thing the designer does in getting up a design, after settling in his mind the lines he intends working on, is to roughly sketch out on drafting paper the general outline scheme. Take for example the coffee set illustrated. After the sizes and outlines of the bodies are settled upon and each piece drawn in the proper proportion to one another, and also a general idea of the decorative scheme considered, the whole design is then gone over and sort of evolutionized—that is, worked out in detail, adding here, eliminating there, until the whole combination forms a pleasing, harmonious and artistic creation.

Where his work is placed in competition with others he usually works up his design to the highest degree of finish; sometimes in wash, or pen and ink, making a really beautiful picture. The illustration of the prize placque is reproduced from a wash drawing. This piece was designed and made as an international automobile trophy and represents every branch of the silversmith's art (spinning excepted), and in sterling silver is mounted on a mahogany panel.

COFFEE SET OF STERLING SILVER.

Again I must refer to his knowledge of the different arts. He must know the material he is working in. A motive suitable for decoration in chased or repouse work requires an entirely different treatment and feeling when used in etched work. Also the surface to be ornamented must be considered and a certain amount of plain space must be left to form a proper contrast with that which is decorated.

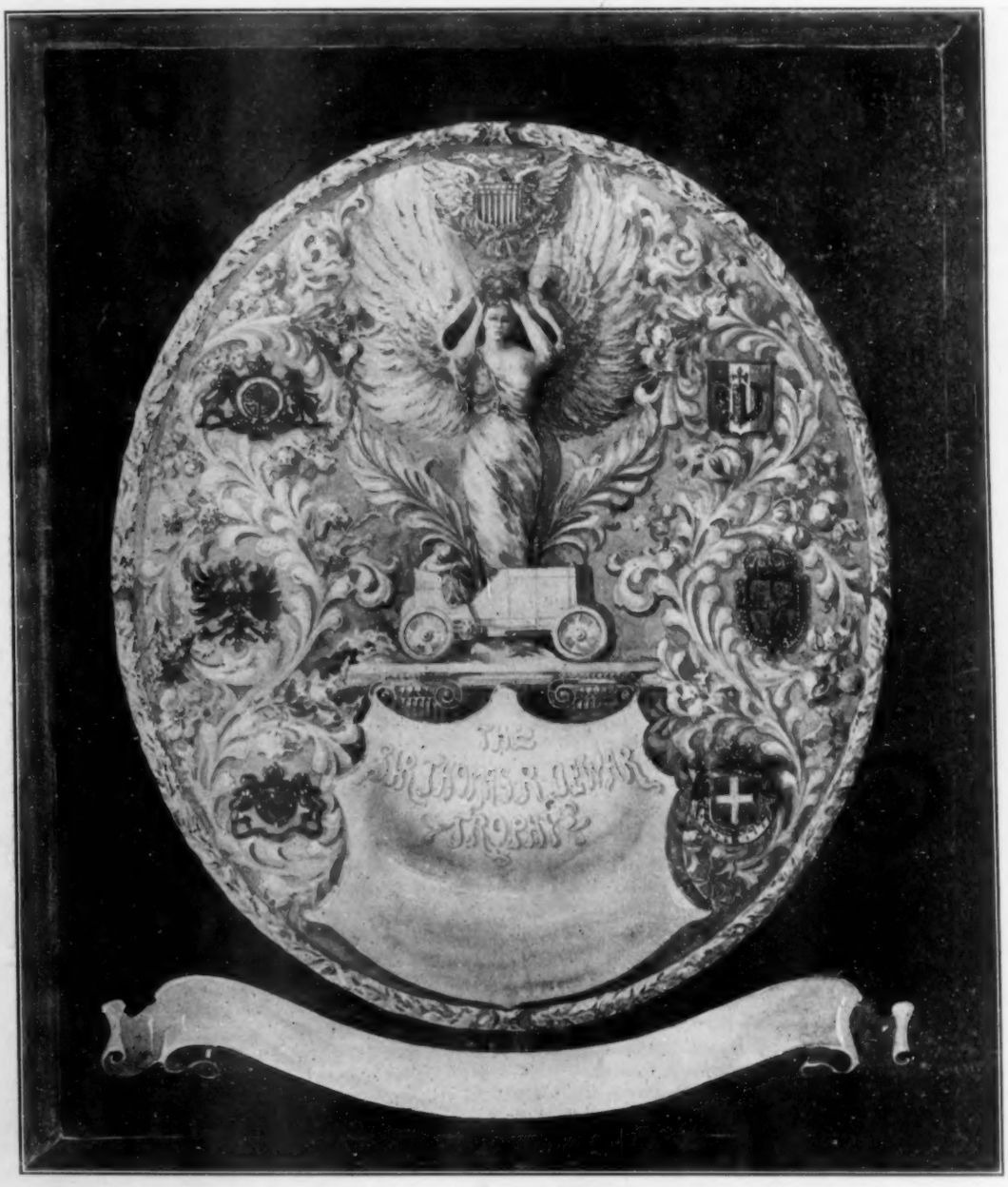
There should be the closest relation between the artist and artisan. While modern shop methods prevent them being one and the same, nevertheless, the results are much nearer the ideal when the two work hand in hand. The so-called arts and crafts movement is doing much in bringing this ideal condition into many up-to-date shops and should receive every encouragement.

While this article is on design, it is necessary to refer to these essential conditions to give a true idea of the

designer's work and position. He must also be well versed in the different periods of ornamentation and must be able to feel, to a certain extent, the tastes and influences of the condition of the time of the different styles of ornament that he incorporates in his work. For example the quiet, classical work of the Greek, the barbarous splendor of the Byzantine and Gothic periods, and the light capricious character of the courts of the Louis's.

The so-called "art nouveau" movement has given the designer of metal work, as well as his fellow artists and artisans, a chance to deliver himself from the traditional schools of ornament. It has given him a desire to create and beautify and see nature in an entirely different way, using her various moods to express his ideals of beauty in his metal work.

In concluding this article I must say that the designer is offered much more encouragement in his work to-day than he was some years ago, when it was a common expression among the trade that anything went in silver. People's tastes have become more educated in all matters of art, and know the true from the false in metal work as well as in other art matters. That is the ideal condition the designer strives and hopes for—that his efforts may be appreciated and his wares be objects of beauty to be placed within the reach of all.



THE PRIZE PLACQUE IN STERLING SILVER.

Examination of the tailings of Egyptian gold mines shows that the people of old knew how to recover practically all the gold, with the exception perhaps of the very lightest particles. The ore was ground between granite stones and the gold was caught on stone tables which inclined enough to permit the water to run off freely.

LINES ALONG WHICH ELECTROPLATING IS ADVANCING.

By R. D. Foster.

To those familiar with electroplating operations the last three years have shown much improvement in methods, and at the same time there has been clearly defined the direction along which any further advance must be made.

As with other trades, the industry of electroplating has shown increased gain in volume and prosperity, although in order to meet the enormous demand it has been necessary to provide a marked increase of facilities. Modern up-to-date plants exist in every section of the country. The larger and more finished plants are undoubtedly installed in the East, where there are in existence electroplating plants using daily between 15,000 and 20,000 amperes of current. The West, however, is coming into line, and if the present ratio of increase is maintained it will only be a short time before this section of the country will be larger consumers of current for electroplating than is the East at present. The entire industry has shown improvement not only in quality and variety of finish, but particularly in the reduction of cost. Old-fashioned methods are no longer followed; they were too cumbersome and expensive. The modern electroplating plant is in charge of trained engineers who look after the motive power, generators, the economical distribution of the current, etc., while the active operations are in the hands of men fully equipped with chemical as well as practical knowledge of the art.

The trend of all improvement has been entirely along mechanical lines. The generators, which are the nucleus of all electroplating operations, have been perfected to a very high point, and while a few years ago a generator having an output of 5,000 amperes was a rarity, to-day numbers are in use. This country is at the present time exporting generators to the older countries for the reason that the American manufacturer has been able to produce a low-priced machine which will compare favorably in efficiency and economy of operation with those built in other countries.

The most marked advance has been in the adoption of mechanical apparatus for handling the bulk of cleaning and plating operations, and it is this particular line which has received the most attention from manufacturers of plating supplies, for notwithstanding the enormous business which has been handled by electroplating plants, the demand for the plating of small articles and necessary parts has been far ahead of the facilities provided, and manufacturers have been obliged to adopt a quick and efficient method of handling this form of work which, under old methods, was allowed to accumulate in the plating room and which became the bane of the superintendents of such departments. Basket plating of small work is practically a thing of the past; it was expensive, carrying a heavy loss of anode metal and the results obtained were uneven. The present up-to-date shop is equipped with mechanical plating apparatus, some shops using 20 or more, and it is now possible to handle an enormous bulk of work per day, and in many cases turn out this work from the plating apparatus so that no further polishing or finishing is necessary. A large factor in the former cost of electroplating has been the charge for stringing and unstringing work, the cost of wire, etc. This factor is eliminated under the new method, and there are instances where 30 or more hands receiving from 50 cents to 75 cents per day were laid off, this form of labor being entirely dispensed with where plating apparatus are use. In some of the larger plants highly perfected apparatus for cleaning, plating and polishing work are installed behind locked doors so jealous are the owners of the form and operation of the machine. An apparatus of this kind takes the work in an unfinished state, passes it through the various cleaning and preparatory operations, then through the plating bath and finishes it in a condition ready for the market. The cost of some of these automatic appliances is reckoned in thousands of dollars, but they are so efficient, their capacity so large and in operation so satisfactory that their adoption by the larger trade is only a question of time.

Mechanical and electro-chemical cleaning of work can also be noted as an advance over other methods. In fact, the tendency of the entire trade is towards the adoption of mechanical handling, cleaning, plating and finishing of work. The records of the Patent Office show within the past year a great number of patents applied for or granted for different types of mechanical plating and finishing apparatus. Some of these will never be used, as they are complicated and expensive to make and operate. The ideal mechanical apparatus is one which will present the work to the action of the anode and electrolyte in as near the relative position as the article would be when strung from a wire.

Among the simpler and more efficient machines on the market is the apparatus made by a plating supply firm in Newark, N. J., with whom I am connected, and who have built many mechanical devices and who control valuable patents along these lines. This firm had placed on the market upwards of 500 apparatuses in the past two years, and some of their customers are using 15 or more with most excellent results. Other makers have evolved different types of plating apparatus or devices for handling a specific class of work.

There are to-day in use in this country mechanical devices for handling barrel hoops which are electro-galvanized, the hoops being finished in large rolls and cut to size after being plated. Wire and steel tape are being treated in the same manner, these being drawn through successive tanks for cleaning and preparing, thence running through the plating bath, then through a polishing operation and finally wound on reels ready for the market. Rods in long lengths are being plated mechanically. Buffing and polishing of stove parts is also carried on automatically.

Individual apparatus for cleaning and scrubbing are also used, the machines being so constructed that the work passes through rapidly revolving wire or fibre rolls, scrubbing liquid being furnished to facilitate the cleaning operation. In fact, the whole industry of electroplating has been forced, by the necessity of turning out increased quantities of goods at reduced cost, to devise or perfect methods for automatically handling work, and we can confidently assert that within a few years it will be necessary for plating rooms to be equipped with all the latest devices for mechanically handling work if they are to compete successfully in their trade.

When alcohol, denatured by the wood alcohol-benzine or the wood alcohol-pyradin formula, is not suitable for use in an industry, the regulations provide for the authorization of the use of alcohol denatured under a special formula. When necessary more than one formula is authorized for the same industry.

GAINING A UNIFORM THICKNESS IN NICKEL DEPOSITING.

By C. S. Barbour, Jr.

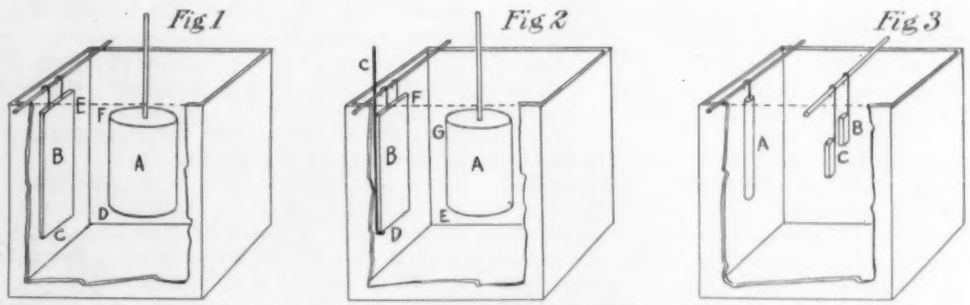
C. S. BARBOUR, JR.

It often happens that a plater, in handling large work, is confronted with the necessity of getting a uniform deposit on castings or other work whose general shape makes it impossible to turn them in the vat. Take, for instance, a large rod 8 feet in length 1 inch in diameter, over which a sleeve is to slide. This rod, if measured with a micrometer, shows a variation of less than one-half a thousandth of an inch. The sleeve is bored sufficiently large to allow a tight sliding fit after a deposit of .002 inch of nickel on both rod and sleeve. If the nickel tank is large enough to allow the rod to be entirely covered by the solution, while on a level, well and good; but if, as often happens, it is necessary to hang it in an inclined position, the lower end will receive a much heavier deposit than the upper portion; if to overcome this tendency the rod is reversed during the operation, the middle of it will show a variation of about 25%. Now, according to the generally accepted theories, this variation of deposit is due entirely to the difference of density of the solution. On the face of it this explanation appears plausible, but as the same trouble is encountered to a greater or less degree with solutions when agitated, it would appear that this explanation does not entirely cover the ground.

A number of years ago the writer was engaged in nickeling a quantity of castings 18 inches in diameter and 20 inches in length having a 3 foot shaft projecting from one end. As the nickel vat was only 40 inches square it was impossible to reverse the work and considerable trouble was encountered by the apparent impossibility of getting the deposit of the same thickness at the top of the casting as at the bottom; the variation, while only about .002 of an inch, still caused considerable trouble. After trying to overcome the difficulty by agitation, etc., the different dealers in platers' supplies, manufacturers of plating dynamos, etc., were consulted. Their opinions were identical in every case. The trouble was in the variation of the solution's density and could not be overcome except by building a larger tank and turning the work. These opinions did not entirely satisfy the writer, and after several weeks of experimenting he finally hit on the real explanation of the trouble and its remedy. As is usually the case with these troubles it proved a very simple matter when once understood.

In the sketch the cylinder A is the cathode, B the anode. Now, one of the first natural laws governing electricity is that a current will follow the path of least resistance, and as the nickel anode is by far a better conductor than the solution, the current will naturally follow the anode as far as possible before leaving it for the cathode; in other words, there will be a stronger current passing from C to D than from E to F, consequently the deposit at D will be heavier than at F.

Having established a working theory the next step was to prove the truth of said theory. In figure 2 A represents the cylinder, B the anode, C an insulate wire fastened to the bottom of the anode. The anode rod was now disconnected, the current reaching the anode at the lower end at D, then following the anode to F, crossing to G. A careful examination now showed that the deposit was thicker at G, the upper portion of cylinder, than at the lower end, thus proving that the varying density of the solution has little or nothing to do with the varying thickness of the deposit. The anodes were now reconnected, every other one being connected at the top, the others connected at the bottom, the weight of these being supported by hooks on the anode rods, but the connection being broken by pieces of rubber tubing placed between the rod and the hooks. This method practically overcame the difficulty, and while the center of the cylinder received a trifle lighter plate than the ends, the difference was too slight to take into account. It is not the intention of the writer to give the impression that all the current runs to the extreme end of the anode before leaving it, but that the greater part does so is an established fact. In the example given the nickel deposited at the lower end of the cylinder plated with the old connection measured .0035 inch, that at the upper end .0025 inch, proving that there was 40% more current passing from C to D than from E to F.



GAINING A UNIFORM THICKNESS IN NICKEL DEPOSITING.

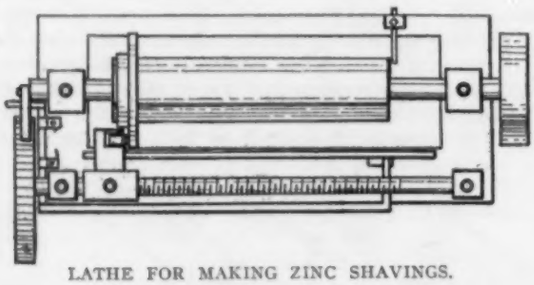
Following this idea further, the writer then took two small iron plates each 1 inch thick, 2 inches wide and 3 inches long, hanging them in the solution as in Figure 3, using a long, narrow nickel anode ½ inch thick, 1 inch wide and 8 inches long, the anode being connected at the top in the usual manner, and the cathode being wired separately. Both cathodes were weighed separately before and after plating, with the result that C, the lower cathode, was shown to have received fully one-third more deposit than the upper one. While to the majority of platers this point may appear to be of little importance, yet in many cases a thorough knowledge of this phenomenon may be of value.

When the plater is using a large, deep vat, hanging his work one piece below another as is customary, the lower

pieces receive anywhere from 10 to 40% more nickel than the upper ones, making it necessary to run the entire batch sufficiently long so as to get the required amount on the higher pieces. Now, if the anodes are wired as suggested, half connected at top and half at bottom, there will be a saving of from 10 to 40% on time, also a saving of from 10 to 40% of nickel hitherto wasted on the lower articles.

LATHE FOR MAKING ZINC SHAVINGS.

The difficulty with the common type of machine for making zinc shavings is that the roll of zinc, which is from 1 to 2 inches thick, cannot be entirely cut loose from the mandrel, and as the precise thickness of the cut cannot be regulated, there are always a number of ragged edges of the roll which catch the shavings and cause them to roll tightly around the mandrel and roll of zinc. Another trouble is that the tool is liable to penetrate too deeply into the roll and cut the mandrel; or if it is regulated so that it will not cut the roll there will be a considerable amount of zinc wasted.



LATHE FOR MAKING ZINC SHAVINGS.

These difficulties are claimed to be all overcome in a machine patented by Ralph S. Browne, of Alameda, Cal., December 24, 1907. According to this invention a slot is cut in the mandrel on which the zinc is to be rolled paralled to the axis. A sheet of zinc is then made into a roll which is loosely secured to the mandrel, the edges of the zinc being soldered together. The long sheet of zinc to be made into shavings is then soldered to the loose cylinder of zinc on the mandrel and is then wound around the same until it makes a cylinder about 1 inch or more thick; its end is then soldered to the main part of the cylinder and the machine is ready to work. This cylinder of zinc has two possible motions—one of rotation due to the turning of the mandrel, and the other of translation due to the fact that it is loose on the mandrel and has a tongue projecting into a slot in the mandrel. A movable collar on the mandrel is then caused to move along the same by means of a sliding arm, an anti-friction wheel preventing an undue loss of power. When the machine is running the collar moves the zinc along the mandrel and as the mandrel rotates at high speed the zinc is cut into fine shavings as it comes in contact with a fixed cutting tool.

The Acting Secretary of the Treasury has rendered the following decision: On the exportation of lead wool or shredded lead manufactured by the United Lead Company, of New York City, either wholly with the use of imported lead or with imported pig lead in combination with domestic lead, a drawback will be allowed equal in amount to the duty paid on the imported material so used, less the legal deduction of 1 per cent.

METHOD OF PRODUCING STEEL DIES.

According to letters patent issued to George Funes Diez, of New York City, his process consists in producing steel dies directly from the object to be reproduced without the necessity of engraving the die. The invention consists essentially in depositing iron electrolytically directly upon the surface to be reproduced and then in so treating the iron matrix thus formed as to convert it into a grade of steel best suited for producing positive impressions in the material chosen for the copies.

The process is particularly applicable for the reproduction of the finest type of engraving where faithfulness of the copy is important, since it is possible to produce directly upon the bodies to be copied a film of exceeding fineness—so fine and homogeneous in texture as to produce a deposit which from beginning to end is white like tin and at the same time so free from corrugations, roughness or crystalline structure as to have the softness of silk to the touch. In this respect it is claimed that iron is far superior to copper for the copying of all kinds of metals, coins, etc., and it has the further advantage that the iron copy can be converted into steel of any degree of hardness so that it may be used directly for making positive copies of the original.

In carrying out the process there is first prepared a bath of 1,000 cubic centimeters of a saturated solution of iron sulphate and 125 cubic centimeters of a saturated solution of sodium bicarbonate. Only half of the soda is mixed with the iron and this is allowed to stand for 12 hours, when it is filtered and the remainder added when the whole is permitted to stand 24 hours. This constitutes the electrolyte, in which the articles to be copied are hung and connected to the electric current so that they form the cathode. The anode is composed of an iron plate. For the best results the current should range between 0.7 and 1.5 volts, while the density of the bath must be from 18 to 20 degrees Baume, and the temperature should be about 21 degrees centigrade if it is desired to deposit the metal rapidly, but a temperature as low as 16 degrees is quite practicable.

The time during which the molds should be kept in the bath will depend upon the desired thickness of metal to be obtained. Under normal conditions a matrix thick enough for light stamping can be obtained in from three to four days, depending upon the dimensions.

The matrix is too soft for use and it must be hardened. This is done by placing it in a crucible and covering it with a paste made of charcoal powder 8 parts, steel filings 1¾ parts and ferro-cyanide of potassium ¼ part, mixed with oil. The crucible is maintained at a red heat for from 8 to 10 hours. This converts the matrix into the finest steel, which may be tempered, when it is ready for stamping metals.

It is stated that the reproduction is so perfect that no retouching is required. The bath will work perfectly for many months and it is only necessary to clean the anode from time to time, since it may contain impurities which will form a black coating. It is also necessary from time to time to add some of the saturated solution of bicarbonate of soda so as to make up losses due to evaporation and to maintain the level of the bath. The soda serves to remove the oxide from the body of the liquid, which oxide rises to the surface and forms a film consistent enough to serve as a cover to the bath, thus keeping out impurities floating in the air.

Diamonds imported into this country and intended for industrial uses are free of duty under the provision of the tariff act for "bort."

STUDYING A BRONZE MASTERPIECE AND THE OPTICS OF "COLORING."

By W. N. Nelly.

W. N. NELLY.

In looking at photographs of work turned out by one of the greatest founders that ever lived—whose name is known all over the world—the one that made the "lost wax" process as practical as we all are aware it is to-day (Alexander Nelli, of Rome, now deceased), I notice among others a tablet of heroic size with an elaborate border, plain, deep sunk ground and a silver inscription.

The letters are large, Roman style, few in number, and made of solid silver and elevating about ⅜ in. from the background. The tablet being about 20 x 8 ft., was cast in one piece, excepting the letters, in a dry-sand mold.

To study the principles underlying the effectiveness of this tablet as a whole is a most fascinating theme for us to-day; for us who have developed our minds in this characteristic era of industrialism; for us who begin to associate science and art. In short, to look at things from a scientific point of view.

Let us study at first the color of this tablet. It is a pigment color, applied with lacquer of course.

What makes it so effective, revealing as plainly as words could what an energetic hand, what a trained, scrutinizing eye combined in forming it.

What makes it show so beautifully even in the photograph? Well, scientifically we say: That man had in mind the beautiful, harmonizing, vivid effects produced by using complementary colors.

What is the keynote, the secret, underlying the beautiful tints-effect which the great masters of the brush and color obtained in their canvasses?

Why complementary colors effects, whose harmony is what sympathetic resonance is in the production of musical tones. In artistic bronze castings the large majority of us admire the "patina." What makes a patina successful, beautiful to the eye? It is that nice contrast of colors of the piece, aided and improved by scratches or furrows or grooves, undercuts and the like, blended by the lustre of the bronze itself in some cases. It is the background we have for the work.

It often came under my observation how a "bronze," with a patina that would look nearly perfect in the coloring room, taken into the office would look the opposite—just fit for the "dipping room"; taken out in the packing room with bare, brick walls, the patina would look still worse.

Where the daylight came from, a window or skylight, would not change the good or bad effect; it was consequently the light refracted from the walls that impoverished the effect of the patina. There was absorption of light in some parts; in other parts the red alone, pure or impure, would send more powerful impressions back to the eye, thus causing that "what makes that color look so poor?" or "that color could be improved" thought.

The nice, proper way of presenting a bronze fascinates the prospective buyer's eye. Why not study how to get the most effect out of a "color" from a scientific point of view? Why should the best patinas of artistic bronzes be obtained in most cases merely by chance?

In this same line of artistic bronzes, of which there is such a large output, what would prove a more effective change upon the present ordinary way than to have a silver and bronze combination? P. E., a vase of brown bronze color with silver or silver-plated panels, bronze and silver artistic lamps, electroliers, porcelain and bronze effects, etc.

We had lately silver and gold deposit work introduced in a very large scale in the market, producing the most brilliant effects and which encountered the general favor.

If some practical, energetic manufacturer of to-day would work out those suggestions from a great master's work and bring some innovations in the worn-out way of manufacturing art goods we would see our products elevated far above the products of any other nation.

In answer to the many requests I had to say more about the Janitsheck moulding mixture, I will say that my friend, Mr. Janitsheck, has informed me that he is not ready to let the thing out yet, and that he will soon make manifest some good things in the shape of innovations which will prove of great value to the trade.

REDUCING SWEEPINGS OF GOLD AND SILVER.

By J. C.

The process of reducing sweepings of gold and silver, running from $1 to $1.50 in metal, depends to a considerable extent on the character and quantity of the materials. If they contain a great deal of organic matter, such as dust and wood, the process is about as follows:

The mixture is to be placed in shallow iron pans, and if wet, it is to be dried over a slow fire, and then burned off, being covered with sheet iron to prevent fine particles from escaping. The burning should not only char the material but should be continued until most of the organic matter has been absolutely burned off, and nothing remains of it but fine white ashes. This will leave a mixture of ashes and metal; if the latter includes iron, this should be withdrawn by passing a magnet through the mass a number of times; and before throwing the iron aside it should be gently shaken and brushed to remove any particles of precious metal that adhere. The iron should not be thrown away, but put among the coarse residue which is melted in a lead furnace. The material treated in this way is the less valuable. Iron is absorbed in the lead furnace, but it is difficult to handle in a crucible melt. The fine residue left after removing the iron is melted with a mixture of carbonate of soda and potash, and a little borax. It is up to the operator to adjust these fluxes, which must be varied according to the character of the mass, especially if the latter has lime in it, in which case a little sand is sometimes helpful. When the mass has been thoroughly melted, the pot is to be shaken or tapped to settle all the metal, which is then to be poured into an iron mold and the ingot subjected to the usual gold and silver parting process, which we presume is generally well known.

The trouble experienced by the platers in controlling their solutions and costs and the quality of their work is simply evidence that the electroplating shop ought to be, and must become, an electro-chemical and metallurgical laboratory on a commercial scale; that the handful of this, the pinch of that, and the bucketful of the other—yes, even the drachm and ounce and gallon—must give place to the gram and the liter; in short, that science must foster an industry that was born of science.

ENDURANCE TESTS OF AUTOMOBILE CASTINGS.

We have received from the Henry Souther Engineering Company, of Hartford, Conn., the results of tests of aluminum alloys made upon their endurance testing machine. These samples were furnished by the Syracuse Aluminum & Bronze Company, of Syracuse, N. Y., and the mixtures are those used by that company for parts of automobiles, such as crank cases, gear cases, etc. From the table of tests it will be noted that those mixtures containing practically only aluminum and zinc gave by far the best results. Sample No. 37,262 failed after 1,550,400 revolutions for one end and 1,618,300 for the other end. This sample contained

Copper	0.34	parts
Zinc	16.24	"
Aluminum	83.42	"

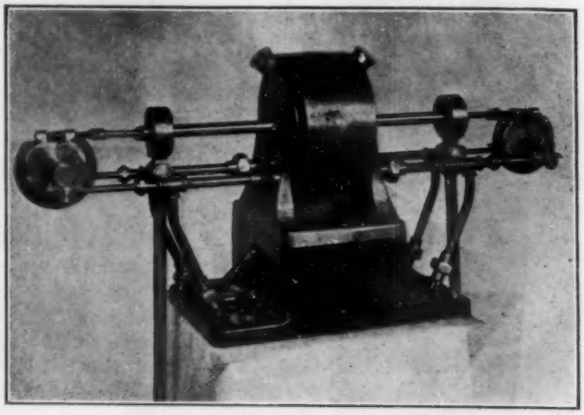
Still more remarkable results were obtained from sample No. 40,332, one end of which did not fail at 9,980,800 revolutions, and then, after the load had been increased 50 per cent., only failed after 822,200 additional revolutions. This was composed of

Manganese	0.01	parts
Zinc	16.24	"
Aluminum	83.75	"

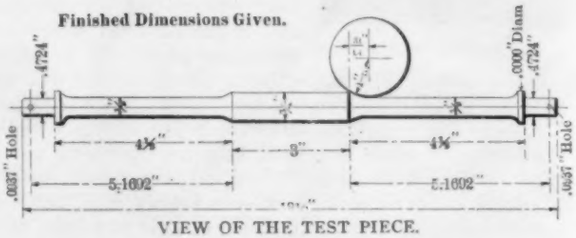
The first mixture in the table, containing no zinc and 7.84 per cent. copper, showed an average endurance of 687,550 revolutions for the two ends.

The White-Souther endurance testing machine, upon which these tests were made, is equipped with ball bearings and can be run at high speed without heating. In ordinary practice this speed is about 1,300 revolutions per minute. The specimen C to be tested passes through the pulley A, mounted in the ball bearings B, and at each extremity is connected to a revolution counter, as shown in the half-tone. At each end of the specimen is placed a ball bearing DD, from which rods depend, carrying the weights.

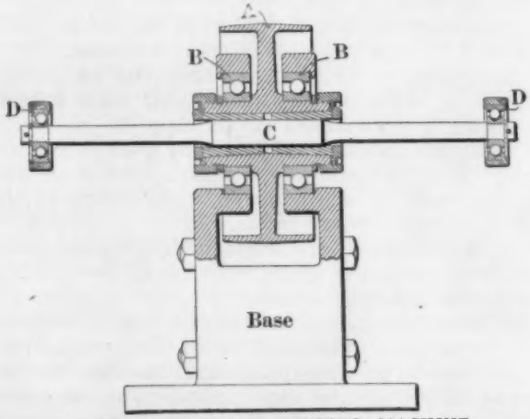
The specimen to be tested is a double ended one, as will be seen from the sketch, thus giving a sort of check test. If a flaw exists in one end, the chances are the other end may be sound and a normal result obtained. It will be observed that this form of specimen permits a standard tensile piece to be cut from the center and unstrained portion of the specimen after the dynamic test has been completed.



ENDURANCE TESTING MACHINE.



VIEW OF THE TEST PIECE.



SECTION THROUGH TESTING MACHINE.

TABLE SHOWING ENDURANCE TESTS.

Sample.	Analysis.	Spec. Grav.	Maximum Strength per sq. in. lbs.	Load suspended from end of 4.50" specimen, lbs.	Fibre Stress lbs. per sq. in.	Deflection over 4.50".	Revolutions necessary to cause failure. No. 1 End.	No. 2 End.	
	Mn. 0.11%								
	Cu. 7.84%								
37261	Zn. ..... None.	2.84	.....	30	10,600	.06"	558,600	816,500	Failed.
	Al. 92.05%								
	Mn. ..... Trace.								
	Cu. 0.34%								
37262	Zn. 16.24%	2.97	.....	30	10,600	.05"	1,550,400	1,618,300	Failed.
	Al. 83.42%								
	Mn. 0.02%								
	Cu. 8.86%						Broke		
40330	Zn. ..... None.	2.88	21,900	30	10,600	.06"	immediately.	466,900	Failed.
	Al. 91.12%								
	Mn. 0.54%								
	Cu. 3.06%								
40331	Zn. 15.20%	3.08	27,800	30	10,600	.05"	507,200	327,100	Failed.
	Al. 81.20%								
	Mn. 0.01%								
	Cu. ..... None.								
40332	Zn. 16.24%	2.94	24,900	30	10,600	.05"	240,200	9,980,800	No. 2 did not fail.
	Al. 83.75%								
Same speciment—increased load to				45	15,900			822,200	Failed.

After running Specimen No. 2 on Sample 40332 for practically ten million revolutions, under a load of 30 lbs. without failure, the load was increased 50 per cent., or to 45 lbs., to hasten tes'

VAPOR GALVANIZING.*

By Alfred Sang.†

[In former issues of The Metal Industry we have presented detailed descriptions of the hot, cold and dry galvanizing processes. We now find in the paper by Mr. Sang a most exhaustive discussion of these methods of galvanizing and also of vapor galvanizing, which portions we here reproduce. The paper of Mr. Sang is the most thorough that has appeared on the four methods of galvanizing.—Ed.]

The credit attaching to the first attempt to coat metals by means of zinc vapor appears to belong to a Frenchman, Jean Pierre Chambeyron, from whose English patent, granted in 1864, for "Improvements in protecting iron and steel against oxydation," I quote the following extracts:

"My invention consists in causing metallic vapors to penetrate into iron and steel to prevent their oxydation * * * By my invention I incorporate into iron or any oxydable metal in a state of metal vapors, either zinc alone when the contact of oxygen is only to be counteracted, or a volatile combination composed of 18% of tin, 12% of lead and 38% of zinc * * * I obtain such results by placing the iron heated to a very high temperature in a non-oxydating medium, by converting into vapors the protecting metal, and by causing them to penetrate into the iron by powerful pressure * * * (the furnace is then described) * * * The metals to be incorporated into the iron are poured in a molten state into the funnel, and thence falling into the retorts are instantaneously converted into gases on account of the high temperature within the retorts. If the pressure created by the gases formed from the metals should not be sufficiently powerful to complete their incorporation into the iron, the degree of necessary pressure can be easily procured by obtaining from the gasometer the required supply of non-oxydating gases which are always therein stored. When the metallic vapors have strongly penetrated into the pores of the iron they will condense by lowering the temperature in the retorts; this must be preceded by the introduction in the retorts of a certain quantity of borax, which by its volatilizing will fix the incorporated metals * * * *Claim* * * * the mode of protecting iron, steel, and other metals from oxydation arising from the oxydating medium into which they are placed, by incorporating into them the vapors of several metals not oxydable, produced at a high temperature and under a pressure greater than that of the atmosphere."

Since then, nothing of especial interest has been brought out, although last year Cowper-Coles secured a patent on a process for ornamenting or coating metals by means of vapor and by using hydrogen and borax; his patent is hedged in by the limitations which necessarily arose from the ghost of the late Mr. Chambeyron's invention.

Metallic vapors have also been suggested, if not used, for coating the filaments of incandescent electric lamps; in such cases a vacuum and high temperatures are employed.[1]

Quite recently, Zenghelis[2] has supplied some very valuable data on the evaporation of metals at ordinary temperatures, which are, therefore, true for all higher temperatures below the point of fusion. In his experiments the metal to be tested was enclosed in an air-tight glass vessel with a sheet of chemically pure silver foil suspended horizontally about one-quarter of an inch above it. Several metals, zinc among others, volatilized very appreciably. The presence of moisture and the reduction of pressure favored the evaporation which was evidenced by the silver foil turning to a golden or other tint on account of the vapor absorbed and alloyed. It took weeks, and months in some cases, to produce results. The important fact was brought out that no action took place where the metals touched and the natural inference is that the metallic vapors were in a dissociated condition.

The more finely a metal is divided, the more readily will it volatilize; its activity in that respect is a function of its free surface. If, in addition to a large proportion of exposed surface, you have a state of physical instability, such as I have assumed zinc dust to possess, you have ideal conditions for ready dissociation under easy conditions.

The origin of the latest process for using zinc vapor is due, firstly, to the investigation of the nature and properties of zinc dust, and, secondly, to an endeavor to get away from one of the drawbacks of Sherardizing, which makes it impracticable for large work, namely, that the articles be buried in the dust.

When I became satisfied as to the volatilizing of zinc from zinc dust at low temperatures, I tried to obtain a coating by immersing copper wire in the vapor, but obtained no appreciable result. It then occurred to me that I might be able to fix this vapor by means of oil and I tried the experiment by dipping the wire in some mineral lubricating oil; within a few minutes I had obtained a silvery deposit. In this experiment there was no reducing agent or carbon mixed in with the dust, and the part of the test tube in which the wire was placed was comparatively cool; the temperature of the flame must have been between 600° and 700° C., or more than 300° below the boiling point of zinc; the wire which passed through an asbestos plug was in contact with my hand; the zinc dust which remained was slightly oxidized on the surface by the air contained in the tube, otherwise it was unchanged. I realized the commercial value which my observation might possess and, I may add, that patents on the broad principles involved have already been allowed in the United States and in Belgium. Since then I have done a considerable amount of experimental work, with varying success until recently, and if good progress has been made in gradually converting the principles involved into practical results; it is in great measure due to my collaborator, Mr. Joseph J. Miller.

(*To be continued.*)

[1]See English patents, No. 2538, of 1882, to J. S. Williams, and No. 2437, of 1906, to H. Zerning.

[2]*Zeitschrift Phys.-Chemie*, Oct. 23, 1906.

*From a paper read before the American Chemical Society (Pittsburg Chapter), and the Chemical Section of the Engineers' Society of Western Pennsylvania, October 17, 1907.

†Vice-President of the Garland Nut & Rivet Company, Pittsburg.

TIN PRODUCTION OF AUSTRALIA.

Consul-General John P. Bray, of Melbourne, reports that 12,091 tons of tin, valued at over $7,300,000, was produced in Australia during 1906, being 1,725 tons more than in 1905. The following quantities of tin were mined last year in each of the producing States: New South Wales, 1,300 tons; Queensland, 4,823 tons; Tasmania, 4,473 tons; and Western Australia, 1,495 tons.

CHEMICAL, COMMERCIAL AND COMMON NAMES OF SUBSTANCES USED IN DIPPING, PLATING AND COLORING OF METALS.

By Chas. H. Proctor.

CHAS H. PROCTOR.

A good deal of confusion often exists because of the indiscriminating use of the chemical, commercial and common names of substances in formulas for dipping, plating, coloring and lacquering of metals. Oftentimes in my own experience, when experimenting with various formulas both native and foreign, the terms given have been somewhat confusing and requiring search among the different authorities upon the subject to find a correct solution of the formula. I give below the named of acids and chemical compounds I have used at various times in my labors and believe the list covers the whole field.

ACIDS AND ACID COMPOUNDS.

Acetic Acid. Hydrogen acetate; hydric acetate; acetulic acid. When free from water it is termed acetic anhydride; mono-hydrated acetic acid; glacial acetic acid; acid of vinegar.

Benzoic Acid. Hydrated benzoyl; salt of benzoin; flowers of benzoin or benjamin.

Boracic Acid. Boric acid; hydrogen borate.

Chromic Acid. Chromic anhydride; chromium trioxide; anhydrous chromic acid.

Citric Acid. Salt of lemons; acid of lemons.

Hydrochloric Acid. Muriatic acid; hydrogen chloride; chlorydic acid; spirit of salt; marine acid.

Hydrocyanic Acid. Prussic Acid; hydric cyanide; cyanhydric acid.

Nitric Acid. (Aqua fortis. Latin); (acidum nitricum, Latin); nitric acid anhydrous; nitric anhydride.

Nitro-Hydrochloric Acid. (Aqua Regia. Latin); Nitro Muriatic acid. (Solvent for gold and platinum.)

Oxalic Acid. (Acidum oxalicum. Latin.)

Salicylic Acid. Ortho oxybenzoic acid.

Sulphuric Acid. Oil of vitriol; vitriolic acid. (Acidum sulphuricum. Latin.)

Sulphurous Acid. Acid sulphurosum.

Tartaric Acid. Acid of tartar; essential salt of tartar; dextrotartaric acid; (acidum tartarum. Latin).

ALCOHOLS.

Alcohol. Ethyl alcohol; ethyl hydrate; proof spirits; spirits of wine; (absolute alcohol is called anhydrous alcohol); (alcohol vini. Latin).

Amylic Alcohol. Fusel oil; potato oil; oil of potato spirit; hydrated oxide of amyl.

Methylic Alcohol. Wood alcohol; wood naphtha; wood spirit; pyroxylic spirit; pyroligneous spirit.

ALUMS.

Alum. Sulphate of aluminum and potassium; octahedral alum salt; potash alum; (alumen a potassium. Latin).

Ammonia Alum. Sulphate of aluminum and ammonium; (aluminii et ammonii sulphas. Latin).

Burnt alum. Dried alum; (alumen exsiccatum, Latin).

Chrome Alum. Double sulphate of chromium and potassium.

Roach Alum. Roman alum; red alum; (alumen Romanum. Latin).

Soda Alum. Sulphate aluminum and soda; (sulphas aluminæ et soda. Latin).

There are a number of aluminum compounds that are seldom used, consisting of the acetates, chloride, fluoride, hydrate, nitrate, oxide, silicate, sulphate and sulphide.

Ammonia, Solution of. Ammonia; ammonia water; spirit of sal ammoniac; ammonium hydrate; spirits of hartshorn; (liquor ammoniæ. Latin).

AMMONIUM COMPOUNDS.

Ammonium Carbonate. Neutral carbonate of ammonia; volatile salt; carbonate of oxide of ammonium.

Ammonium Bicarbonate. Acid carbonate of ammonia; ammonia and hydrogen carbonate; mono-ammoniac carbonate.

Ammonium Chloride. Sal ammoniac; muriate of ammonia; (ammonia muriatica. Latin).

Ammonium Nitrate. Nitrate of oxide of ammonia; nitrous ammoniacal salt; (ammoniæ nitras. Latin).

Ammonium Oxalate. Ammonic oxalate; (ammoniæ oxalis. Latin).

Ammonium Phosphate. Tribasic phosphate of ammonium.

Ammonium Sulphate. Sulphate of oxide of ammonia; (ammoniæ sulphas. Latin).

Ammonium Sulphide. Sulphuret of ammonia; hydrosulphuret of ammonia.

Ammonia Sulphydrate. Sulphide of ammonia; hydrosulphide of ammonia; ammonium and hydrogen sulphide.

Amyl Acetate. Banana oil; pear oil.

Amyl Valerianate. Apple oil.

ANTIMONY AND ITS COMPOUNDS.

Antimony Metallic. Regulus of antimony; (stibium. Latin).

Antimony, Butter of. Antimony trichloride; chloride of antimony; sesquichloride of antimony; (antomonii chloridum. Latin).

Antimony, Red. Crocus of antimony; oxysulphide of antimony; oxysulphuret of antimony.

Antimony Sulphurated. Golden sulphuret of antimony; precipitated sulphide of antimony; (antimonium sulphuratum. Latin).

ARSENIC AND ITS COMPOUNDS.

Arsenic Acid. White arsenic; arsenious acid; arsenic anhydride; (acidum arsenicum. Latin).

Arsenic Disulphide. Realgar; red sulphide of arsenic; arsenic bisulphide.

Arsenic Trisulphide. Orpiment; yellow sulphide of arsenic; tersulphuret of arsenic; king's yellow.

BARIUM COMPOUNDS.

Very few of these compounds are used in electroplating. They consist of the acetate, arsenate, bromide, carbonate, chloride, chlorate, ferrocyanide, hydrate, iodide, nitrate, oxalate, monoxide, phosphate, sulphate.

Barium Sulphide is the only compound in general use. Sulphide of barium; barium mono-sulphide; baric sulphide.

CALCIUM COMPOUNDS.

Calcium Carbonate. Chalk; limestone; marble; calcite; calc spar; (calcii carbonas. Latin).

Calcium Chloride. Muriate of lime; (calcii chloridum. Latin).

Calcium Hypochloride. Bleaching powder.

Calcium Sulphate. Plaster of paris; gypsum; calcic sulphate; (calcii sulphas. Latin).

There are many other calcium compounds, but they have no connection with plating.

Of the carbon compounds the only one of any interest is the

Carbon Sulphide. Bisulphide of carbon; carbon disulphide; (carbonei bisulphidium. Latin).

COPPER COMPOUNDS.

In Latin all copper compounds have the symbol "Cuprous."

Copper Acetate. Crystallized verdigris; neutral or normal acetate of copper.

Copper Carbonate. Dicupric carbonate of copper; green copper carbonate.

Copper Chloride. Cupric chloride; neutral chloride of copper.

Copper Nitrate. Cupric nitrate.

Copper Oxide. Red oxide of copper; suboxide. oxide.

Copper Sulphate. Blue vitriol; blue stone; blue copperas; Roman vitriol.

GOLD COMPOUNDS. (*Aurium.*—Latin.)

Gold Chloride. Aurous chloride; gold monochloride.

Gold Monoxide. Aurous oxide.

IRON COMPOUNDS. (*Ferrum.*—Latin.)

There are a great variety of iron compounds, many of them of no interest to the electroplater.

Citrate of Iron and Ammonia. Ammonia ferric citrate.

Chloride of Iron. Ferric chloride; perchloride of iron; permuriate of iron; sesquichloride of iron.

Oxide of Iron. Ferric oxide; iron peroxide; red oxide or iron; rouge; Indian red.

Sulphate of Iron. Green copperas; green vitriol; protosulphate of iron.

LEAD COMPOUNDS. (*Plumbum.*—Latin.)

Lead Acetate. Sugar of lead; plumbic acetate.

Lead Carbonate. White lead.

Lead Oxide. Litharge; yellow oxide of lead; lead monoxide.

MAGNESIUM COMPOUNDS. (*Magnum.*—Latin.)

Magnesium Carbonate. Carbonate of magnesia.

Magnesium Oxide. Calcined magnesia.

Magnesium Sulphate. Epsoms salt; magnesic sulphate; cathartic salt.

MERCURY COMPOUNDS (*Quicksilver*).

(*Hydrargyrum.*—Latin.)

There are a large number of mercury compounds. I give those only of interest to the plater.

Mercuric Chloride. Corrosive sublimate; bichloride of mercury; perchloride of mercury.

Mercuric Cyanide. Cyanide of mercury; bicyanide of mercury; prussiate of mercury.

Mercuric Oxide. Yellow oxide of mercury; red precipitate; peroxide of mercury.

Phosphorous Acid. Tribasic phosphorous acid; orthophosphoric acid; tryhydric acid.

PLATINUM (*White Gold*). (*Platina.*—Latin.)

Platinic Chloride. Chloride of platinum; perchloride of patinum; tetra-chloride of platinum.

Platinic Ammonium Chloride. Ammonia chloride of platinum; platino-chloride of ammonium.

POTASSIUM COMPOUNDS. (*Kalium.*—Latin.)

Potassium Acetate. Acetate of potash; potassic acetate; diuretic salt.

Potassium Carbonate. Salt of tartar (pearlash impure); carbonate of potash; normal potassium carbonate.

Potassium Bicarbonate. Hydrogen potassium carbonate; bicarbonate of potash; acid potassium carbonate.

Potassium Cyanide. Cyanuret of potassium; cyanide of potash; potassic cyanide.

Potassium Ferricyanide. Red prussiate of potash; potassium ferricyanuret.

Potassium Ferrocyanide. Yellow prussiate of potash; ferro-prussiate of potassa.

Potassium Hydrate. Caustic potash; potassa hydrate; hydrated oxide of potassa.

Potassium Nitrate. Nitrate of potash; saltpeter.

Potassium Binoxolate. Salt of sorrel; essential salt of lemons.

Potassium Sulphate. Normal potassium sulphate; diopotassic sulphate; vitriolated tartar.

Potassium Bisulphate. Potassium hydrogen sulphate; acid potassium sulphate; bisulphate of potash.

Potassium Sulphide. Sulphuret of potassium; liver of sulphur; hepar of sulphur.

Potassium Sulpho Cyanide. Sulphocyanuret of Potassium.

Potassium Tartrate. Soluble tartrate; neutral tartrate; tartrate of potassa.

Potassium Bitartrate. (Argols impure); cream of tartar; crystals of tartar; acid tartrate of potassium.

SILVER COMPOUNDS. (*Argentum.*—Latin.)

Silver Chloride. Argentic chloride; monochloride of silver.

Silver Cyanide. Argentic cyanide; hydrocyanate of silver.

Silver Nitrate. Argentic nitrate; lunar caustic.

Silver Oxide. Proto-oxide of silver; silver monoxide.

Silver Sulphide. Sulphuret of silver; silver glance.

SODIUM COMPOUNDS. (*Natrium.*—Latin.)

Sodium Carbonate. Sad soda; soda crystals; washing soda; salt of barilla; mono-carbonate of soda.

Sodium Bicarbonate. Hydrogen and sodium bicarbonate; hydrosodic carbonate.

Sodium Chloride. Common salt; marine salt; muriate of soda.

Sodium Hydroxide. Caustic soda; hydrate of soda.

Sodium Hyposulphate. Hypo.; sodium; thiosulphate.

Sodium Nitrate. Cubic niter; Chilian saltpeter.

Sodium Phosphate. Tribasic phosphate of soda; perlate salt; tasteless salt; hydrodisodic phosphate; phosphate of soda.

Sodium Pyrophosphate. Normal sodium; pyrophosphate.

Sodium Silicate. Water glass; soluble glass; quadrasilicate.

Sodium Sulphate. Glaubers salt; wonderful salt.

Sodium Acid Sulphate. Bisulphate of sodium.

Sodium Sulphite. Sodic sulphite; sulphite of sodium.

Sodium and Potassium Tartrate. Rochelle salts; tartarized soda; salt of sergnette.

SULPHUR BRIMSTONE.

Liver of Sulphur. Mixture of potassium polysulphides with potassium sulphate.

Precipitated Sulphur. Milk of sulphur; hydrate of sulphur; (sulphuris hydrus. Latin).

Sulphuretted Hydrogen. Hydrogen sulphide; sulphydric acid hydrogen mono-sulphide.

TIN COMPOUNDS. (*Stannous.*—Latin.)

Stannous Chloride. Protochloride of tin; dichloride of tin.

Stannous Chloride Hydrated. Tin salt.

Stannous Hydrate. Hydrated oxide of tin.

Stannous Oxide. Protoxide of tin; monoxide of tin.

Stannic Chloride. Bichloride of tin; perchloride of tin; permuriate of tin.

Stannic Sulphide. Bronze powder; mosaic gold; bisulphide of tin.

WATER. (*Aqua.*—Latin.)

Oxide of hydrogen; protoxide of hydrogen.

ZINC COMPOUNDS. (*Zincum.*—Latin.)

Zinc Metallic. Spelter.

Zinc Acetate. (Zinci acetas. Latin.)

Zinc Carbonate. (Zinci Carbonas. Latin.)

Zinc Chloride. Muriate of zinc; butter of zinc; (zinci chloridum. Latin).

Zinc Cyanide. Cyanuret of zinc; (zinci cyanidum. Latin).

Zinc Oxide. Zinc white; peroxide of zinc.

Zinc Sulphate. White vitriol; white copperas; salt of vitriol; (zinci sulphas. Latin).

THE ALUMINUM INDUSTRY IN AMERICA.

By E. Blough.

Aluminum was discovered by Wöhler in 1827. The history of aluminum from that date to the present time can be divided into three periods. The first period embraces the years from 1827 to 1854; the second period is covered by the years 1854 to 1886, and the third period is from 1886 to the present time.

During the first period aluminum was entirely a chemical curiosity just as radium is a chemical curiosity now. Its characteristics were very little known and the metal had not been obtained in quantities sufficiently large to permit the determination of its properties.

In 1854, twenty-seven years after the first discovery of the metal, Deville devised a new method for the extraction of aluminum from its compounds. By the action of metallic sodium upon aluminum compounds Deville was able to obtain aluminum in large masses and he himself determined many of its properties. In fact, Deville did so much toward the development of the aluminum industry that he may properly be called "The Father of Aluminum." The method of Deville required first the manufacture of sodium and then the use of this sodium in the extraction of metallic aluminum. While many of the admirable qualities of aluminum were well known in the period frfom 1854 to 1886, yet the high price of the metal prevented its use for industrial purposes.

In 1886 Charles M. Hall invented the process for the extraction of aluminum which enabled the metal to become of practical use. The method of Hall makes use of the electric current for the decomposition of aluminum oxide dissolved in molten cryolite. In 1888 the Pittsburgh Reduction Company was organized for the production of aluminum on a commercial scale by the Hall process. A small factory was established on Smallman street, in Pittsburgh, Pa. In 1890 this plant was increased in size several times. In 1891 in order to secure more room for the enlargement of the plant, the entire equipment was moved to New Kensington, Pa., 18 miles from Pittsburgh on the Allegheny River. At this plant a rolling mill, wire mill and rod mill were built in order to supply the increasing demand for wrought material. About this time the electrical development of water power in the United States made rapid progress. Accordingly in 1894 The Pittsburgh Reduction Company built a plant at Niagara Falls for the utilization of the cheap and convenient electrical power. In 1900 the Northern Aluminum Company built an aluminum plant at Shawinigan Falls, Province of Quebec, Canada. This plant supplies the Canadian trade. In 1902 The Pittsburgh Reduction Company established a plant at Massena, N. Y., to use the power developed from the St. Lawrence River by The St. Lawrence River Power Company. With the establishment of works at Massena the wire mill was moved to that place in order to better supply the increasing demand for aluminum as an electrical conductor. To supply the aluminum oxide is used in the process, bauxite mines were opened in Arkansas and Georgia. To produce pure aluminum the bauxite must be refined, and a plant for this purpose was built at East St. Louis, Ill. During recent years the plant at Niagara Falls has been increased to three works and the Massena plant has been gradually increased, as have also the rolling mill and works at New Kensington. On January 1, 1907, the name of The Pittsburgh Reduction Company was changed to the Aluminum Company of America.

It is only in the third period of its history that aluminum has taken its position among the so-called common metals. The price has gradually dropped from $90 per pound in 1856 to about 35 cents per pound at the present time. With the decrease in price and a better understanding of the properties of the metal has come a correspondingly increased and widening use. To-day we have the metal used as an important part in all automobiles, as one of the principal metals used for electrical conductors, as a deoxidizer for steel, as parts of electrical goods, for cooking utensils, sheet metal articles, and many other important uses.

DRAWPLATES OR WHORTLES ARE NOT PLATES.

The United States Circuit Court of Appeals, in the case of the C. Newman Wire Company vs. the United States, has decided that the provision in paragraph 135, tariff act of 1897, for steel "plates" does not include articles not in the form of sheets; and wortles and so-called drawplates, which are not in such form, are not embraced therein. The decision says:

"The dictionaries generally define the term 'plate,' in accordance with common usage—as a *sheet* of metal. There is nothing of the nature of a sheet of metal about these 'drawplates' or 'wortles.' The 'wortle' is a steel bar with several holes of diminishing diameters, through which the wire is drawn. The 'drawplate' is a steel block with an elongated end and with holes similar to those of the 'wortle.' The 'drawplate' is a plate in name only. Undoubtedly, steel plates were formerly used to draw wire through; and, as is not uncommon, the earlier name clings inappropriately to the later development. But misnomer alone can not make the provisions of section 135 applicable. Nor is there anything in the testimony of commercial usage to make them applicable. The articles may be called, but not described, by the name 'drawplates.' They are not known as 'plates.'"

AMERICAN METAL TRADE CONDITIONS FOR 1907—OUTLOOK FOR 1908.

By S. D. V. Burr.

During the year past there have been no new developments having a far-reaching effect in either the methods of producing the non-ferrous metals or their treatment in manufacturing. The good old customs still prevail in mining and refining, and in manipulating afterward. New and promising deposits of lead and zinc have been opened and the search for platinum among the black sands has continued. In 1906 tin for the first time entered into the table of mineral products of the United States prepared by the Geological Survey, the value being $35,600, from Alaska and South Dakota. Last year there were no new developments in this metal.

Commercially, the first three months of 1907 gave promise of great activity; prices of raw and manufactured articles were high and the demand in all directions had an imperative character that held bright promise for the future. Work was plenty and wages high. The maximum was reached in March. The money stringency advanced slowly, and culminated in the autumn when the bank and trust company troubles attained the climax The result of the money scare in all the metals we are interested in may be explained in this way The handler and dealer in manufactured products refused to replenish stocks—the manufacturer curtailed production—the miner faced a falling market for his output. Prices tumbled all along the line.

Indications show that confidence is returning and that the depression was only a flurry and not a calamity. Mills all over the country are resuming full operations, this being particularly the case with the tinplate industry. This last item is significant, since a demand for tinplate means activity along many lines. Money is becoming easier and the borrowing power is returning. Prices of raw metals are still low, particularly copper, but they will undoubtedly advance with reduced output and increased business.

COPPER.

Of all the metals copper has been the most interesting one to watch. Not only is this true of the price, which ranged from 26½ to 11½ cents per pound, but also of the strictly industrial end of the metal. Developments have taken place in the trade which are most important and which may lead to radical changes in the industry. Many expect that the opening of mills in the Middle West may mean the first stage in the passing of the influence which has been for so long exercised by the Naugatuck Valley. The opening of mills in Michigan is significant.

The equipping of the Buffalo Copper & Brass Rolling mills with motors throughout marks a great advancement and presages more near relation with most modern ideas.

Last March the producer had the upper hand and the big consumers had to buy copper at 26½ cents. But with the advent of financial stringency things changed. Because of curtailed demand the consumer was relieved of the position where he had to buy irrespective of the price; he could reduce his output. The producer held the price as long as possible and then dropped by the quarter point. But the market had taken on a new aspect, and the consumer was independent. The result; copper fell and finally struck bottom at 11½. The whole depression has been attributed by some to the electrical industry which slumped, and in the slump carried the whole market with it. When this revives, and revive it must with the railroad electrification of the whole country behind it, the aspect will be altered.

The stocks of retailers of copper articles and articles in which copper plays a major part, have been depleted to the extent that the shelves are practically uncovered. The plumber and hardware dealer throughout the country are bare of stock and at present do not seem anxious to replenish. But their stock must be renewed and with the return of confidence the goods will be ordered.

In 1906 the output of copper was 917,805,682 pounds, valued at $177,595,888; last year the output was 895,-104,000 pounds, valued at $184,937,437. The production decreased, while the value increased. It has been estimated by the Geological Survey that this amount of copper was obtained from 19,743,000 tons of ore, from which we calculate that the yield was less than 5 per cent., or, in other words, every 100 pounds of ore produced less than 5 pounds of metal. Working with such lean ores it will be seen that the cost of mining, smelting, refining and selling copper places a definite barrier lower than which copper cannot be sold. While the producer is very reluctant to give any precise information as to the actual cost of his business, it is well understood that copper around 10 and 12 cents is not a money-making proposition. The only hope for the producer is the handling of vast quantities of the metal in order to make his business pay at all. If this be true of the heavy producer, then the small miner has no chance in the running whatever. Europe is now buying copper and the producer is obtaining money from abroad. The Chinese are now also large buyers, just as they have always been buyers when they knew the price was lower than the metal was really worth. They are wise and are always ready to gamble on a sure proposition. Last November 34,000 tons of copper were bought for foreign account; and in December 37,000 tons went in the same direction.

At the present time copper is nominally 14 cents, but it is doubtful if it can be purchased at that price, especially in large quantity. The mills want the metal and the producer wants an advance on the price. It is the case of nine months ago, but with the contestants reversed. The consumer can wait, but he cannot wait very long. For these reasons it is freely predicted that there must come a rise.

BRASS TRADE.

The brass trade has varied but little during the year, the prices for products changing with the price of copper. Nothing new has been developed in the trade and no new fields have been exploited.

NICKEL.

Neither in the past year nor in the year previous did the United States produce any nickel, most of our supply coming from Ontario; the same is true of cobalt. The uses for the metal remain the same, for plating and alloying and for government coinage.

LEAD, TIN AND SPELTER.

Last year we produced 349,584 tons of lead as against 338,095 tons in 1906. During the early part of last year the consumption marked a new record, the greater portion of this demand being for the manufacture of sheets for the chemical industry and for use in the lead covered cable industry. The price reached 6 cents, but this finally fell to 3½ in December. The feature of the year has been the unprecedented activity in lead and zinc mining projects, companies being formed oftener than weekly with the avowed purpose of developing some more or less promising property. That lead cannot remain at the low figure it at present occupies is a foregone conclusion.

Tin has been active in the market with lead and spelter. In 1906 the United States, which had produced no tin for many years before, entered with 2,500 pounds obtained from 3,750 pounds of concentrates from the Gurthrie Mine in the Black Hills of South Dakota. Our supply of this metal comes from abroad except for the insignificant amount mentioned. Queensland, Australia, is now a producing factor of considerable extent, since last year the output was valued at $2,063,970 for the first nine months as compared with $1,705,800 for the first nine months of 1906. During 1906 the Federated Malay States shipped 64,922 short tons of tin, of which Great Britain took 37,957 tons and this country 16,543 tons. In sympathy with all the other metals the price fell during the last part of the year, reaching the neighborhood of 30 cents in December. Last year the States sent abroad 41,453 tons.

Spelter has followed very closely the path traced by lead, both in price and production.

ALUMINUM.

The production of this metal in 1906 was 14,910,000 pounds, valued at $4,262,286, and for last year the production is estimated at 17,000,000. During the year the price has fluctuated from 36 to about 50 cents. A peculiar fact about this metal is that it is now higher, although it has felt the depression along with all the others, than it was at the beginning of 1906. While strictly new uses have not been found for it, it is now entering the electrical field, both in the construction of electric apparatus and for wire. In the manufacture of utensils no new developments have been brought about.

An occurrence of unusual interest is the equipping of the Aluminum Company of America at New Kensington with continuous sheet mills. While mills of this type are common in plants handling only steel, this is the first instance where the continuous mill has been employed for the handling or manipulation of aluminum. Being so successful in the first case we can see no reason why it should not prove just as beneficial in the last.

The automobile industry still consumes a great quantity of the metal, mainly in crank cases and car bodies, for which purposes it is ideal material. This consumption will increase at an even pace with the car business.

Undoubtedly the market for the metal would be vastly augmented if a sure and easy method would be discovered of soldering it. Could this be done effectively it would soon be used in plants which now do not know it.

PLATINUM.

In January, 1906, platinum was worth $20.50 per troy ounce; in June of the same year it was $26; in September $33, and in November $38. The metal stayed at the latter figure until April last year, when it commenced to decline along with the others, finally reaching $27 in December. Last year for the first time a distinction was made between ordinary platinum and hard platinum; that is, platinum rich in iridium and osmium, considerable iridium being allowed to remain alloyed in the platinum of the ingots.

The remarkable rise in the price of platinum had one direct result—the metal was sought for all over the world, and our own country, particularly the West and Alaska, was thoroughly explored, but all the effort so far has only been the finding of what may be called traces —no deposits of the true sort have been uncovered.

During the year, while maintaining its hold in the chemical laboratory and in certain industries where its characteristics make it invaluable, it has found no new field. It is being used more and more extensively as resistance wires in electric appliances, especially small furnaces. For this purpose it is peculiarly adapted.

GOLD AND SILVER.

From data collected by the Bureau of the Mint of bullion deposits in the United States mints and assay offices and by statements from the smelting and refining establishments, the value of the gold production for the year 1906 was $94,373,800, the leading state being Colorado with $22,934,400, Alaska being a close second with $21,365,100. The production of silver for the same period was $38,256,400, Montana and Colorado each furnishing the largest amount, each being about $8,500,000. The gold output of the world for last year is estimated at between $403,000,000 and $405,000,000. During the year South Africa was the only country showing an increase, and this was probably offset by the diminished yield in the other producing countries.

Manufacturers and handlers of these two metals have had an uncomfortable six months. The preparations for the Fall trade were generous and orders were received in large volume. But a few weeks before Christmas countermands began to come in so that the holiday season found manufacturers and la-ge wholesalers far overstocked. Somewhat extended inquiry among dealers in New York showed that the holiday trade was satisfactory in volume, notwithstanding hard money, but the character of the business had changed. There were fewer of the high-priced articles sold and more of the less costly—few hundred dollar sales and many more ten dollar ones. As one dealer expressed it: "There is one advantage in this business; the goods will keep, and we shall have to wait for a better market."

The so-called stamping act we have considered in another column.

JEWELRY TRADE.

The business last year may be divided into two periods, six months of prosperity and six months of steady decline in volume. Importations of precious stones and pearls declined last year $11,000,000, as compared with the previous year when the amount was $43,573,488. The rate of decrease followed very closely in the path of the general depression and was most pronounced at the close of the year. During the flush times purchases ran to solid metal articles and plated wares were not so popular; but this was reversed toward the end.

PLATING.

While nothing strictly new has developed in the plating trade during the year, there are some processes which are receiving more attention than formerly. Polychrome plating is in vogue just now and in many instances the rage is running mad. While the most beautiful effects can be obtained it would be well if the plater would remember that colors cannot be mixed in the most promiscuous fashion and in wild profusion without hurting the business. Garrish effects are never pleasing and the sooner they are cast aside the better for all concerned.

Some little attention has been paid to the metallization of non-conducting bodies such as vases, leaves, flowers and the like and most beautiful specimens have been produced. Work of this kind would undoubtedly find a ready sale, and since the processes are well known it seems strange that more of it is not done.

Vapor galvanizing and the so-termed Sherardizing have not been introduced in this country to any extent. While they are both practical there seems to be a doubt about their commercial possibilities.

BRITISH TRADES IN 1907—OUTLOOK FOR 1908.

By J. Horton.

Those engaged in the non-ferrous trades of Great Britain have no reason to look back with satisfaction upon the year that has just closed. The jewelry trade has been on the whole poor, relieved only by some little recovery of animation just before Christmas. The brass trade has been badly dislocated by copper fluctuations, and other metal trades have all been very much disturbed, companies being very well content if they could get through without serious loss. It seems inevitable that with a high bank-rate and the general falling off in trade the jewelry industry has a poor outlook for next year. Possibly other metal trades dealing in necessaries as distinguished from luxuries may be slightly better off, but the outlook is far from cheerful.

THE JEWELRY TRADE.

In all directions jewelers have gloomy reports to give of the state of business during 1907. Notwithstanding the slightly better assay returns published some time ago, the factors have never been hit harder, but those who have combined factoring with manufacturing have done rather better. A large trade has been done in silver, owing to the extended substitution of this metal for electroplate. In best gold goods, trade has been fair, and on the whole rather better than in 1906. In this line foreign competition has not been felt so severely as with cheaper goods. But in cheap jewelry of light fancy design the local houses have been beaten time after time by German makers.

The most interesting event of the year has been the recent development in regard to what is known as "Shadow Silver." The regulation said to be coming from the assay office has not yet been issued, but it is known that in future silver will not be allowed to be less than 40 gauge R. S. W. G. or .0048th inch thick. Those familiar with gauges will know that this is very thin, but silver coverings on toilet ware are often half this thickness, and are said to be so thin that the thumb nail could be forced through the metal covering, while the effect of a fall to the ground is ruinous.

It may be convenient to give the assay record which on the whole can hardly be said to be discouraging. The weight of articles marked for the year ended June last was 371,036 ounces of gold, being 21,000 ounces more than in 1906, but 36,010 ounces below 1901. The weight of silver marked for the year was 3,720,804 ounces, or a falling off of 117,678 ounces compared with 1906. The figures for 1906, it may be remarked, constituted a record. Generally speaking, the use of gold is increasing more than silver, rolled gold having taken the place of silver to a considerable extent. In considering assay returns allowance must be made for the increasing popularity of the hall mark, which is now almost universally taken as a certificate of quality.

The assay office took a very similar step four years ago in regard to gold upon which a limit of thinness was imposed, and on the whole it is considered that the trade benefited by the restriction. It is significant that the action has been entirely endorsed by the Jewelers' Association, which has for the most part disregarded the outcry which threatened an immense influx of foreign goods. It is quite admitted that if buyers cannot get their thin silver in Birmingham they will go for it to foreign markets, but this is no new experience, and the association, at all events, is more concerned to keep up the quality.

A most important step has been the arrangement by the officials of the Birmingham Jewelers' Association with the university authorities for the adoption of a scheme of commercial education specially adapted to the requirements of the industry. Details of this have already been given and it is sufficient to add that there are signs of increasing interest throughout the trade and it is hoped that the opportunity will be taken up extensively especially by jewelers anxious to equip their sons for a business career in which technical knowledge is an essential requisite.

THE BRASS INDUSTRY.

The violent fluctuations in copper and zinc have made the year an extremely difficult one for everyone in the brass trade. The falling off in business during the last three months was in most cases alarming, and reductions in price have so far failed to yield new business. The increases began in December, 1904, and several others followed, raising the price by 25 per cent. This year has been one of reductions. The first took place in August, taking the form of an increase of discount amounting to 5 per cent., and the next in October of a similar amount. The effect of these two reductions will be equivalent to 20 per cent. reduction on a net selling price. Certain manufacturers declined to raise their prices when copper ascended, and they are now badly hit by the reduction, for they have nothing to reduce to meet the demands of their customers. It is known that some of them are in a very tight place, and some failures would seem to be inevitable. The close of the year finds a considerable amount of short time being worked, a large number of the men not making more than four days per week.

Foreign competition has not been quite so much in evidence as during the previous year, but France is a severe competitor in the most artistic fittings of the electric trade. For the cheaper goods Germany is also a force to be reckoned with. There are complaints by the men as to the increase of women labor, but the employers state that this is only possible in the lighter branches of the trade. As a rule they have refused to work at Capstan lathes on account of the strain upon their energy involved by continuous labor.

OTHER METAL TRADES.

Makers of electroplate have on the whole done better than jewelers, so that the year is closing with a moderate amount of activity. An excellent trade is still being done with the Colonies. The copper tube trade has been terribly handicapped by the dearness of metal, combined with the most ruthless competition. Efforts to obtain a combination have been entirely unsuccessful. Some of the largest houses bitterly complain that combinations successful in America, Germany and Belgium have not been attempted here, solely, it would appear, for want of a common understanding. It is said there are no large stocks of copper in the city, most buyers having invested very cautiously in the boom periods. Very little copper was bought at the top price of £112-10*s*-0*d* per ton, which prevailed in February last. Some assistance was derived during the boom period by the utilization of old copper, which greatly relieved the situation and enabled some firms to make a handsome profit out of their obsolete goods.

The aluminum trade of Birmingham is having an extraordinary run of activity, being altogether unaffected by the prevalent dullness in metal branches generally. The principal demand is for motor car fittings, bicycle gear cases, etc., for which this metal, owing to its durability and its power of resisting atmospheric conditions, is found to be eminently suitable. Some of the Birmingham factories have during the past few months been working day and night, and the trade tends to increase.

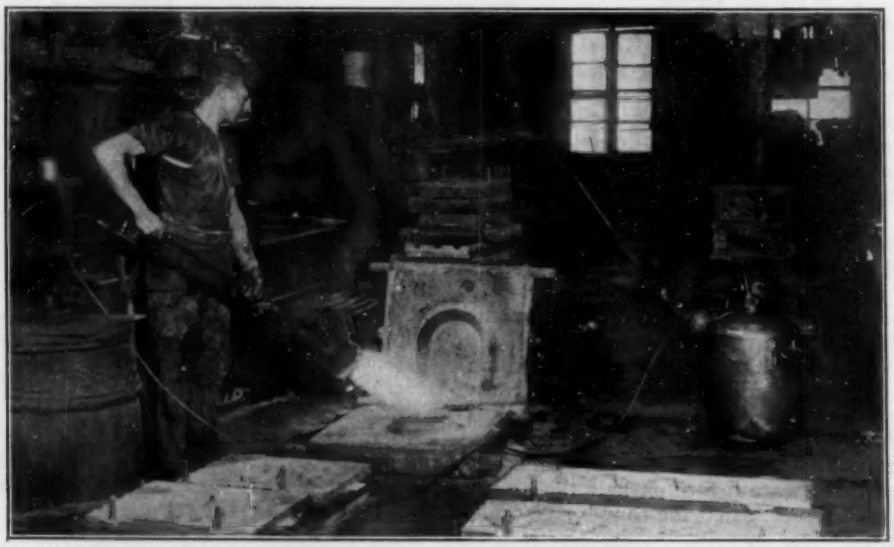
INDUSTRIAL

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

THE ROCKWELL PORTABLE SKIN DRYING OUTFIT.

The outfit here shown is self-contained, being entirely independent of a compressed air supply, and consists of a "Rockwell" portable kerosene burner, seamless steel oil and air reservoir fitted with hand air pump, pressure gauge, hose connections, and flexible, metallic or rubber hose, as desired, for conveying the oil from the tank to the burner.

It is an indispensable adjunct to the foundry, being easily removed from place to place as required for skin drying molds and cores, heating ladles or crucibles, melting soft metals, such as babbitt, tin or lead, and heating a casting preparatory to burning in patches, kindling fires, etc.



ROCKWELL PORTABLE SKIN DRYING OUTFIT.

It is very simple to operate, it being only necessary to fill tank two-thirds full of kerosene or coal oil, raise the pressure to 25 pounds by a few strokes of the pump attached; and allow a small quantity of oil to flow on some waste, placed in the mouth of the burner, and ignite; after allowing about five minutes to sufficiently heat the generating coil in the burner the oil supply is opened until a suitable flame is obtained.

Where compressed air is available a type of burner manufactured by the same concern is recommended, in which crude oil as well as refined oil can be burned.

This outfit is placed on the market by the Rockwell Engineering Company, 26 Cortlandt street, New York City.

Cuprous sulphite or red copper compound is rapidly replacing the acetate and carbonate of copper in the production of deposits of copper, bronze and brass. The results obtained with this compound have been eminently satisfactory. Its use avoids to a large extent the trouble experienced in plating iron, in the nature of blistering. It also does away with this trouble in the deposits upon lead and its alloys.

NEW ELECTRO-CLEANING COMPOUND.

By Chas. H. Proctor.

Recently there has appeared upon the market a new electro-cleaning compound manufactured by the Imperial Chemical Company, of Cleveland, O. This compound will prove of unusual interest, since it not only cleanses iron and steel, but also tin, copper, zinc, brass, bronze, Britannia metal and the soft metal alloys, thereby overcoming the objection to using an electro-cleaner on account of the limited field of operation.

Having been favorably impressed with the claims made for this cleaner the writer made numerous inquiries of those who had used it, and in every case the claims of the manufacturers were substantiated; the answers were highly commendatory in every instance.

The idea of cleansing metal with the aid of the electric current is not new; in fact, it has been in vogue for a number of years. Several years ago the writer used an electro-cleaner made up from cyanide, caustic soda and salt. Upon iron and steel excellent results were obtained with this composition, but as a universal cleaner it was of no use. Upon iron and steel this composition is theoretically correct on account of its non-oxidizable effect upon them; but for use upon copper, brass, bronze and the soft metal alloys, especially when united with soft solder, a secondary reaction takes place, causing a redeposit upon the surface by the dissolving action of the solution, in the boiling state, upon the softer metals. This occurs with decided effect when endeavoring to cleanse tin, Britannia, or the lead and antimony alloys with caustic compositions unless unusual care is taken.

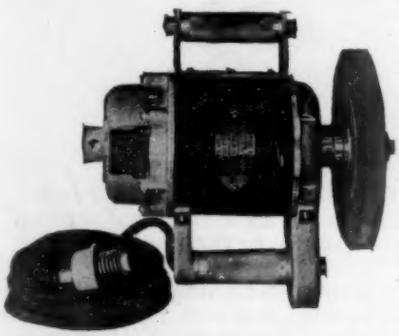
In the new compound referred to it seems the difficulties enumerated have been overcome. Even at the boiling temperature it does not affect the surface of any metal, other than to accomplish what it was designed for—the removal of every trace of organic matter from the surface.

While there is some diversity of opinion in regard to the theory of the action of electro-cleaners, the writer believes it is due to the evolution of ox-hydrogen gas upon the surface of the metal when under the influence of the current. This destroys the deposit upon the surface of the metal by the gas generated, which, rising to the surface of the solution, carries the organic matter with it, thereby leaving the metal chemically clean.

This solution can be arranged anywhere. An ordinary iron tank with steam connections is all that is necessary. The tank is connected with the positive or anode pole; while an insulated rod in the center of the tank is connected with the negative pole or cathode. No switchboard is required, as the more current there is the quicker the work is performed. The amount of work that can be successfully cleaned by this method would surprise those who clean in the old-fashioned way, and they would understand why some platers are able to accomplish so much in so short a time and at such a small expenditure for labor.

PORTABLE METAL GRINDING AND BUFFING MACHINE.

The cut illustrates a new grinding machine which is meeting a most favorable reception in machine shops and foundries for grinding castings. The operating and controlling switch is located in the right hand handle of the machine, thereby obviating the necessity of the operator releasing his hold on the machine for starting and stopping. The bearings are made of phosphor bronze and arranged for convenient lubrication, and are provided with dust proof oilers. The machine is air cooled by a rotary fan mounted directly on the armature shaft. It is arranged so that a buffing wheel or special shaped emery wheel may be interchanged. The emery wheel furnished with the machine is 8 inches in diameter by ¾ face.



The machine when used as a buffer is well adapted for use around garages, engine and dynamo rooms, etc., for polishing bright parts.

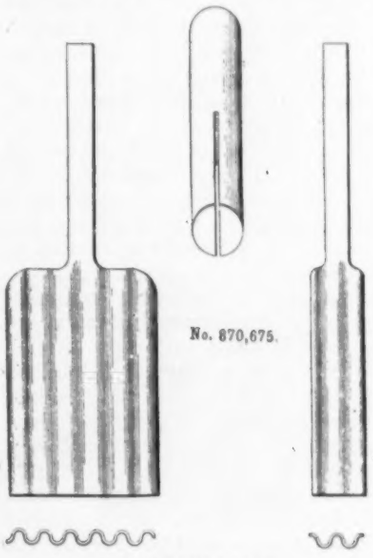
Another and important application of this machine, and one that will appeal to die makers in sheet metal plants and drop forging works, is that the dies can be ground while they are in the press, thus saving all the time consumed in taking out and resetting.

The machine has an eye bolt fitted on the top so that it can be suspended with a cord and counterbalance, relieving the operator of the weight if so desired. The machine weighs 25 pounds complete, and is furnished for 110, 220 or 550 volts direct current. They can also be wound for any special voltage. Power is taken from any ordinary lamp socket. Further particulars can be obtained from the makers, the Cincinnati Electrical Tool Company, Cincinnati, O.

It is a significant fact that those metals most amenable to the electroplating process are metals which alloy readily and which are easily soldered together. Hence the theory that both electroplating and soldering depend for the firm uniting of two metals on surface alloying at the point of contact.

ELECTRODES.

It is common to make electrodes for electro-chemical analysis of platinum, in the form of coils, rings, disks and the like and to provide them with round shanks for insertions in the ordinary screw post terminals. These are relatively heavy and expensive and are subject to abrasion and wear in the terminals. Accord-



NEW ELECTRODE.

ing to an invention for which patents were issued November 12, 1907, to G. A. Guess, of Silverton, Colo., and H. E. T. Haultain, of Nelson, British Columbia, provision is made for a light and efficient electrode. The new electrode consists of thin, sheet platinum, having a blade corrugated lengthwise to render it rigid, and a tang or shank adapted to be frictionally engaged in a slitted terminal binding post. The form is clearly brought out in the drawing here presented.

An international exhibition of modern appliances for lighting and heating will be held in St. Petersburg, Russia, beginning December 14 next.

The imports into Russia of lake copper, according to the report of the American consul at Odessa, from the United States in 1905 amounted to 7,476 short tons, but in 1906 to only 2,263 short tons. This was attributed to a growing demand for that copper at home. The general dearth of copper and the traditional wealth of some old Russian copper mines, abandoned when labor became high priced, has attracted the attention of enterprising minds, and the next twelvemonth will probably show to what extent Russia can participate in the world's supply of copper.

The export of Cape Colony diamonds during 1906 amounted to $33,247,076, or a large increase as compared with 1905, the greater part of which, both cut and uncut, went to the United States through European ports. In addition to the export of Transvaal diamonds through Cape Colony last year amounted to $7,729,301; Orange River diamonds, $4,046,928, and Rhodesia diamonds, $28,469. The consul at Cape Colony states that the De Beers Mining Company at Kimberly has discharged 500 men in order to reduce their output for a time while the surplus stock of stones on hand is disposed of and to maintain the price of diamonds.

A NEW ELECTRIC FURNACE.

By E. F. Hoskin.

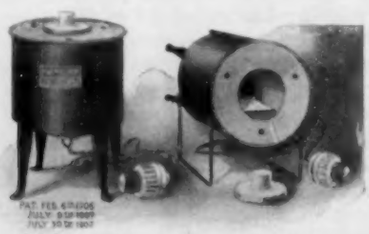
The electric furnace for commercial use is conceded to be the next step in advance of oil heated and gas heated furnaces, just as these means of obtaining heat have supplanted the coal and coke furnaces.

There are two chief types of electric furnaces, the arc type and the resistance type. The arc type as used by Moissan, and others familiar with its operation and successful handling, is useful to produce extreme temperatures, but the difficulties of maintaining the arc when the furnace is started and even until it gets quite hot are only met by constant attention of the operator. Another difficulty of the arc type is the small amount of energy that can be utilized at the commencement, when in order to get prompt and satisfactory heating the energy used should be at its maximum. To illustrate, if a gas furnace was to be heated the air would be needed at the highest pressure obtainable, with as much gas as could be used for good combustion, at the start, not after the furnace had become hot. Resistance furnaces are more controllable, the heat is more uniformly distributed and the improved forms open up great possibilities in metallurgical and other operations. The induction type of electric furnace is economical in cost of electricity, but is only suitable for very large installations. There are other difficulties, such as the necessity of retaining a certain part of the metal in the crucible chamber so as to start the next melt and the cost of maintaining the crucible chamber, which on account of its shape is built in sections and requires very carefull fitting. The induction furnace is not suitable for any except the largest operations such as iron and steel making.

In the wire wound resistance type in which platinum wire forms the resistor, only very small laboratory furnaces are used, and these at the present cost of platinum are almost prohibitive in price.

The granular carbon resistance type is very difficult to control because the resistance changes so rapidly with changes in temperature, necessitating a rheostat of large capacity, which is of course wasteful of energy.

It is now possible to obtain wire wound electric resistance furnaces that are practical and durable at a low cost



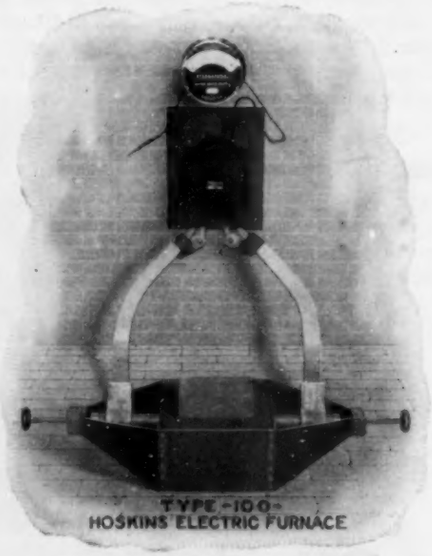
SMALL FURNACES.

as the result of an extended research in high melting point alloys that also have a high electrical resistance. A substitute for platinum is now available that is not as readily affected by reducing gases, or metallic vapors, a very serious drawback to the use of platinum as the resistor in the electric furnace.

This new alloy is stated to have six times the resistance of platinum and stands almost as high a temperature, and has a tensile strength when cold about equal to steel.

Platinum not only decreases in size but is reduced in weight when heated for some time at 800 C. This new alloy, patented Feb. 6th, 1906, and July 9th, 1907, has been heated to 800 C. for 1,000 hours in the air, and showed but slight deterioration, increasing in resistance but 8% and elongating but 1%. The increase in electrical resistance occurs at the first heating and remains very nearly constant during the remainder of its life.

This wire is being used successfully for all types of furnaces and heating devices that do not require a temperature of more than 1,000 C. or 1,832 F. continuously. The furnace illustrated, designated as Type 20, has this patented wire resistance and can be made for any voltage up to 500 and is safe and durable on either alternating or direct circuits. The (Type 100) furnace shown is not a wire resistance type, but has a remarkably easy regulation, a turn of either hand wheel serving to materially reduce or increase the current used, which is always in exact proportion to the heat required. This Type 100 furnace is useful for a wide range of temperature and can be con-



ELECTRIC FURNACE, TYPE 100.

trolled with certainty and without constant attention. As high as 2,000 C. has been reached with a furnace of this type, and yet it can be so made as to give just enough heat for melting lead.

The Type 100 furnace is made for alternating circuits only, and is used with a special transformer which transforms the line voltage to a low value so that there is no danger to the furnace operator. It also has an ammeter so that the operator can see just how much energy he is using; this reading, coupled with the time to reach a certain temperature, enables the operator to repeat with certainty any furnace operation. These furnaces are made in any size of chamber, generally of rectangular form, and opening from the top. Special furnaces may be built to open at the side. Vertical or horizontal tube furnaces can be made in this type.

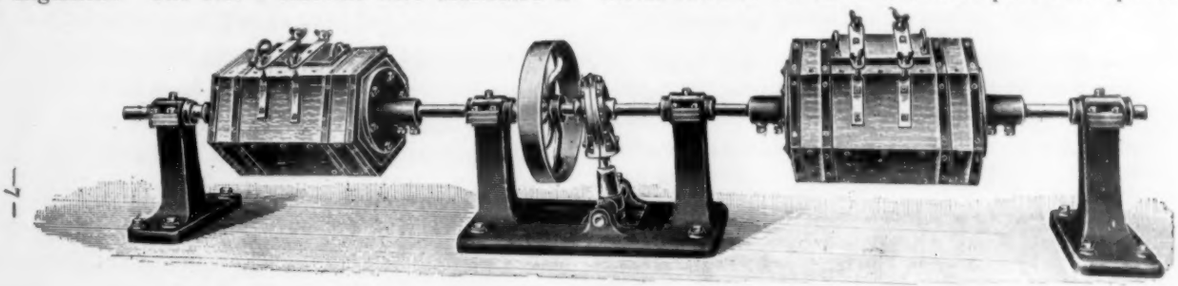
The type 20 furnaces are intended for melting gold alloys, silver alloys, and other alloys in small quantities and enameling. In chemical work, such as fusions, combustions and incinerations, small tool hardening and other operations not requiring more than 1,000 C. or 1,832 F.

The type 100 furnaces are intended for such work as testing fire clays, melting steel, melting nickel and making high melting point alloys, melting brass or copper, melting platinum and for any commercial work requiring temperatures up to 2,000 C. or 3,632 F.

These electric furnaces are manufactured by The Hoskins Company, 93 Erie street, Chicago, succeeding Wm. Hoskins & Co., in 1905, who were the pioneers in adapting gasoline under air pressure as a means of heating furnaces.

THE EDMONDS POLISHING AND BURNISHING MACHINES.

Many advantages are claimed for the Edmonds "Rapid" shaking barrels for polishing and burnishing. Among these is the important advantage arising from the fact that the articles do not readily tarnish; the peculiar movement of the barrel leaves them chemically clean when they leave the barrel, and they therefore take the lacquer more readily and economically than hand polished articles, the pores of which are usually choked with the polishing abrasives used. By a simple patented mechanism a combined rotary and reciprocal motion is transmitted by a single band to the machine. The articles being polished or burnished are thus thrown in every conceivable direction, the cross action of the machine rendering it impossible for the work to get into a train or groove, and ensuring the exposure of all surfaces of the articles contained in the barrel to the scouring or burnishing action. The body of the machine is formed in one casting, permitting accurate machining of the wearing parts and perfect alignment. The No. 1 machine here illustrated is



EDMONDS POLISHING AND BURNISHING MACHINE.

intended for brass foundries, etc. There is also a smaller machine for light trades and a machine for jewelers.

These machines are handled in this country and Canada by the United Wire & Supply Company, of Providence, R. I.

ACID PROOF BRICK AND TILE.

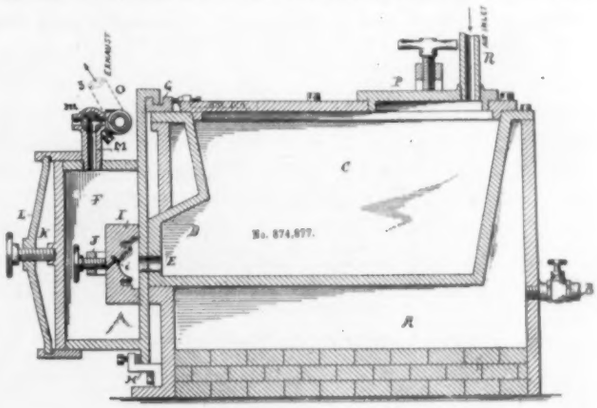
Acid proof brick and tile, used extensively for flooring in plating rooms, copper refineries, caustic soda vats, sulphite pulp digesters, and in fact in all places where an acid proof flooring or lining is required, are rapidly claiming the attention of manufacturers of non-ferrous materials. The New York Brick & Paving Company, of Syracuse, N. Y., have for several years been manufacturing brick and lining. These brick are made of clays of an alluvial deposit and are a mixture of clays containing very little lime or iron; and if any is found in them the extreme heat in the process of vitrification completely destroys any trace of it, thereby making the brick of very superior quality. It is claimed that no acid has yet been found to affect them, and very strong solutions have been used on them. The company state that they have been supplying these brick to brass founders, copper works and pulp manufacturers, and have not yet received a single complaint. The flooring brick are made 2 by 2½ by 7½ inches, and there is a also a double brick measuring 7½ by 7½ by 2 inches.

During the last three or four years large quantities of Haitian silver coin have been exported and sold as bullion, being worth many times more as such than as currency. The few coins remaining are mostly in the hands of the Government and these will now be shipped and sold as bullion.

VACUUM METHOD OF CASTING.

An invention issued to Herbert George Underwood, of Stamford, Conn., December 24, 1907, deals with a method of casting in which the air is exhausted from the mold and the molten metal is forced into the mold at the same time by compressed air. The result is a casting much denser and more homogeneous in mass and much sharper and cleaner in surface than ordinary castings. The melting furnace A is heated by ordinary means such as air and gas inlet B. Supported in the furnace is the melting pot C having a forwardly projecting nozzle D and outlet port E which coincides with the inlet in the faceplate of the mold containing the chamber F which is supported on tracks G H so as to move across the face of the nozzle and thus bring the outlet and inlet ports into or out of coincidence with each other and thereby close or open the outlet E. The chamber F is exhausted of air through the pipe M. Entering the melting chamber is a pipe R through which compressed air can be admitted to force the metal out into the mold when the port E is opened.

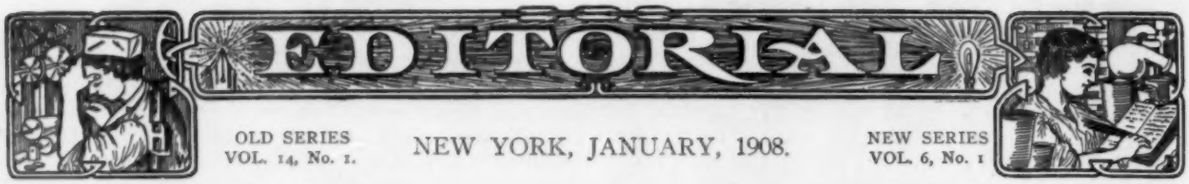
The operation is as follows: After the metal is brought to the proper temperature in a melting pot, the air is exhausted from the mold chamber, which is



VACUUM METHOD OF CASTING.

then moved until its inlet and the mold inlet coincide with the outlet from the melting pot, when the metal flows into the mold which is filled in its smallest part and sharpest angle.

Ideally, the metal dissolved from an anode should equal the metal deposited on the cathode, the bath remaining unchanged. Practically, this desideratum is to-day seldom achieved. Impurities in the anode dissolve in the bath, polluting it, and at the same time metal is deposited on the cathode more rapidly than it is dissolved from the anode. The excess is derived from the bath, with consequent variation in composition.



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THE METAL INDUSTRY

THE CONSOLIDATION OF

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THE BRASS FOUNDER AND FINISHER
ELECTRO-PLATERS' REVIEW
COPPER AND BRASS

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OUR FIFTH BIRTHDAY.

In celebrating our fifth birthday by issuing an anniversary number we had to contend with the business depression of the past few months and were, therefore, restricted somewhat in our plans. But in spite of financial troubles we have succeeded in preparing an issue larger and more varied and interesting than any we have ever published. In establishing this new standard for ourselves we have given careful thought of the numbers to follow this one and have already secured articles covering the entire field in which our readers are engaged. We do not believe tight money is to be a permanent institution; we have a strong conviction that prosperous conditions will be restored, and that very soon. Having this belief we shall keep the pace we now set.

Therefore, this, our first issue of the new year, may be taken as a true copy of what all the succeeding numbers will be. Articles of interest and real value will appear in the February edition and even now we can speak a good word for the March number. These articles are all written by authorities in their special fields and deal with the metallurgical, mechanical and chemical advancement of the world—live problems in founding, finishing and plating, shop practice and appliances will be handled by experts who keep in touch with the world's progress.

THE U. S. STAMPING ACT.

June 13, 1907, the so-called stamping act went into effect. This was an act of Congress forbidding the importation, exportation, or carriage in interstate commerce, or transportation in the mails, of falsely marked articles made of gold or silver, or the alloys of either. Supposedly, the law was passed in the interest of the public, as a protection against being swindled in purchases of gold and silver wares. It was also intended for the welfare of the honest manufacturer and dealer in these wares to relieve him of his unscrupulous and dishonest competitors.

The law has failed dismally to accomplish either of these very desirable objects. It now rests upon the statute books of the United States, to the extent of some 2,000 words, nicely arranged in seven sections, and with the customary repetitions which are considered so essential in legal documents.

This act is alive because it has never been officially killed; but it is of no more service than a live man under a mountain. Technically, both are in actual existence, but neither is doing very well.

Six months of this law has resulted in not a single conviction in any state, territory, or possession of the United States, that we have been able to find. It has had no effect upon the sale of spurious ware; it has been no protection to any one; it was dead when it was born and there has been no resurrection.

The law states that when articles of gold or silver are stamped or marked in any way to convey information as to their composition, they must conform to this marking to within a certain small limit of variation of manufacture. This means that they must not fall below the indication except for a very insignificant amount. Gilded articles can be sent from one state to another by common carrier or in the mails, and sold as pure gold or yellow brass and no one will interfere. But if marked 18 karat it must be 18 karat and not yellow brass. But the maker is not required to mark it at all; there is nothing in the law to compel him to do so. The law only says that if he does choose to make a statement it must be the truth.

The law was probably drawn to provide protection similar to the hall marking systems in vogue abroad. But it failed to have the foundation upon which all those systems rest—particularly the English, French and Swiss—and that is the public assay part of the plan. In those countries gold and silver wares must be analyzed by the government and stamped. If, in this examination, they fail to come up to the statement furnished by the manufacturer, they are destroyed then and there. This provides a guarantee by the government, whose finding is accepted by the people who have been trained to know and rely upon the stamp. There is no escaping this rule, and so accustomed have the public become to the mark that pure gold could not be sold at any price unless it bore the mark. Our own law is not even a poor imitation of the foreign.

If our law had provided that every article of gold or silver must bear a stamp or be accompanied by a statement of its actual composition it would have been better. Then if the Government had undertaken to enforce the law (of course, as restricted to interstate commerce and imports and exports) it would have been still better. Central stamping bureaus or assay offices—there are seven in England—could handle the business; this would have provided relief. The argument that the general Government has not the power to do this we do not think has much ground to stand upon. The upholding of the interstate commerce law made possible the control of foods and medicines, and a law dealing with the precious metals would do the same.

A federal law in conjunction with laws by the states would be all that could be desired. But in both cases there should be ample authority for the carrying out of the law, and prosecutions should not be left to individuals.

We do not think a stamping act will ever succeed in this country unless accompanied by provisions establishing public assay offices and making their use compulsory. Now, the purchaser has no protection except the statement of the dealer of whom he buys—and some dealers are prone to be a trifle dishonest.

There is another side issue of this case. Those manufacturers and dealers who have always dealt with absolute honesty with their customers have won a reputation, which is a very large business asset, and are not violently clamoring for an effective stamping act. Such an act, carrying the Government guarantee, would be as good an investment as business integrity exercised for scores of years. As things now are every buyer who gets cheated by a rogue dealer is a prospective customer of the dealer who has never cheated any one. Then, again, it would take but a very short time to educate the public to the meaning and value of a guarantee having the Government behind it.

OUR CHART OF METAL PRICES.

On page 39 will be found a chart showing the fluctuations in the prices of the non-ferrous metals during 1906 and 1907. The following letter from W. H. Roberts, of Detroit, explains itself:

"Concerning your proposed chart of metal prices I would suggest that you show the prices of the different metals for the past two or three years and then leave space on the chart so that the prices for the next three years, for instance to 1910, could be filled in by readers of your paper. This would simply mean to continue the tracing of lines representing prices from where you leave off the last of this year—in other words, your readers could take the chart and continue to record in the same manner as shown in the first half of the chart.

"This, I believe, would make a very convenient method of recording metal quotations and thereby render comparison with different years a simple matter. It would not be necessary to trace quotations on the chart every day, as it could be done once a week or once a month, but in case it is done monthly, we have found a very good way to keep track of the quotations and at the same time keep the quotations available for instant reference, is to take a small diary which allows space enough for each day for the following stamp:

December 12, 1907.

Tin	32¾c.
Lake	13⅛ to 13¼c.
Electro	13 to 13⅛c.
Casting	12⅝ to 12¾c.
Lead	3.85 to 3.90
Spelter	4.30 to 4.50

"The prices of the different metals are then copied from the commercial report. We have had a rubber stamp made for stamping the different metals as shown above."

We have adopted the suggestion of Mr. Roberts to the extent of leaving a blank space at the right hand side of the metal chart presented elsewhere in this issue, so that the prices for each week or month of the year 1908 can be traced.

CRITICISM AND COMMENT

WE CORDIALLY INVITE READERS' OPINIONS AND CRITICISMS OF ALL ARTICLES PUBLISHED IN THE METAL INDUSTRY. SUGGESTIONS WELCOME.

SENSATIONAL STORIES.

On the 23d of last month the following news item appeared in the New York *Sun*:

The American Brass Company, the largest concern in its line in this country, will shut down all its factories on Tuesday and keep them all closed until after the first of the year. Within the last two months the company has greatly lessened its wage account both by reduction of the number of hours and by laying off men. Further economies, however, are considered advisable, and it is for this reason that it has been determined to shut down the plants for a week. The factories, it was said yesterday, will positively be reopened after New Year's, though probably not at full capacity. As an instance of the extent of the business recession in the Connecticut towns in which the company's factories are located it became known yesterday that 500 immigrants had left Torrington, where one of the biggest plants is located, for the old country. Most of these returned laborers were Huns.

Following our usual custom of verifying every item we find in the daily press, and suspecting the above story was exagerated and misleading, we sent it to the American Brass Company with a request for the truth. We received the letter presented below from the president of the company:

To the Editor of THE METAL INDUSTRY:

I have yours of the 23d inst. and note clipping from the *Sun*. This is altogether misleading and is hardly worth noticing. The shut-down referred to therein is our usual annual shut-down. We always take the last week of the year for inventorying, repairing furnaces, engines, floors, etc., in the various mills. It generally takes a full week to do this and we are doing the same this year that we always do.

Every one knows that business has fallen off greatly during the last six months and we have been gradually reducing our force. I have no doubt 500 people have left Torrington within the last six months. This is a place of 16,000 to 18,000 inhabitants, and there are a considerable number of mills there outside of our own. There has always been a large floating class of Italians there each summer on construction work and public work generally. I do not know that any more people have left there than would ordinarily leave—perhaps a few more under the peculiar circumstances that have existed, but not enough for any newspaper comment, unless it is the desire to create and foster sensational stories.

CHAS. F. BROOKER,
President American Brass Company.

Ansonia, Conn., Dec. 26, 1907.

A CHEERFUL VIEW.

To the Editor of THE METAL INDUSTRY:

I do think better conditions will prevail soon; I am optimistic. I believe what the business men of to-day should practice is optimism. I do not think there is any real cause for difficulty in the business of this country; had it not been for the money panic, as I might term it, we would not have seen business disturbed at all. Just consider for a moment that before this money panic came on there was not a line of business that was not crowded to its utmost.

Now one thing impressed me yesterday very forcibly in regard to the conditions at present; generally when there is a stringency of the money market, the luxuries of life suffer the most. I was in one of our leading jewelry stores yesterday (when I speak of luxuries I consider diamonds, silver, etc., in this line), and desired to have a monogram put on the articles I purchased. The owner of the store said to me: "Mr. Barbour, it will be impossible for me to do that before Christmas because our men are working night and day now and I am getting all the men on the outside that I can possibly get; the last two weeks we have sold over $60,000 worth of our stock."

Well, does this look very panicky? I think not. But here I am writing a long letter, so I will close. I merely refer to this as an illustration that the difficulty is confined entirely to the money condition. I am afraid the American manufacturers get easily scared some times, and they are wholly dependent on the banks to supply them with funds. Without doubt many a manufacturer has curtailed his product unnecessarily, simply because he became a little pessimisitic.

In regard to buying copper, I have no objection to your saying that—it is really the fact—The Michigan Copper & Brass Company expects to be in the market for a round lot of copper the last of this month or early in the new year.

GEORGE H. BARBOUR,
President Michigan Copper & Brass Co.

Detroit, Dec. 19, 1907.

DEFLOCCULATED GRAPHITE.

To the Editor of THE METAL INDUSTRY:

We desire to call your attention to an error, which would be misleading, contained in the statement (December issue, page 381) that our new building will be used for the manufacture of "flocculated" graphite. It should read "deflocculated," since that is the process caused by the "Acheson Effect," reducing graphite to a molecular condition, which is fine enough through the finest filter paper made in America. This is the material which is likely to revolutionize lubricating problems, as graphite in permanent suspension in oil or water has never before been accomplished.

INTERNATIONAL ACHESON GRAPHITE COMPANY.

Niagara Falls, N. Y., Dec. 16, 1907.

AN ANALYSIS OF "BASSITE."

To the Editor of THE METAL INDUSTRY:

In your December issue an analysis of the above material, which purports to be the "truth and nothing but the truth," is given. The analyst has, however, failed to detect the constituent which gives the alloy its chief claim to merit. While "Bassite" can scarcely be said to be a substitute for tin, a number of the mixtures in which it is recommended are of considerable interest.

Wilmerding, Pa., Dec. 27, 1907. JESSE L. JONES.

CORRESPONDENCE

IN THIS DEPARTMENT WE WILL ANSWER QUESTIONS RELATING TO THE NON-FERROUS METALS AND ALLOYS. ADDRESS THE METAL INDUSTRY, 61 BEEKMAN STREET, NEW YORK.

METALLURGICAL.

Q.—I am having some trouble producing castings made of a special mixture of 98 parts copper and 2 parts nickel. The castings are rings 6 inches in diameter, 1½ inches wide and ½ inch thick. The castings must be perfect and I must not change the mixture as it is analyzed. I am using old copper wire; I have some success with this, but have had none with ingot metal. The pouring gate weighs 7 pounds, so you see the trouble cannot be from not having enough feeding gate. Still the castings will come porous. I take good care in melting always under charcoal, and I also pole with hickory. I cannot use a deoxidizer such as silver or magnesium, as it would show in the analysis. I have also mixed the metal, poured it into ingots and then remelted, but there is still the same trouble from porosity. Now can you help me?

A.—We would advise you to mold a cylinder 6 inches in diameter, ½ inch thick and at least 12 inches high with four large risers, one in each corner of the flask. Pour with bottom pouring gates. The cast cylinder can afterward be cut up into rings.—J. L. J.

Q.—(1) Is there any better protection than tin for a copper float which is always wholly immersed in water for protecting it from corrosion? (2) What is the best brass alloy for a plunger, part of which is in water constantly? (3) We would be pleased to have you inform us also as to the ordinary effects upon brass of what is known as alkaline water, alum water and acid water.

A.—(1) Tin is probably the most practical coating for protecting from corrosion such articles as copper floats. Nickel plating has been tried with some success. A good baking japan would be an added protection. (2) For your brass plunger try a mixture of 9 copper and 1 tin; this is a strong, hard metal that will resist corrosion very well. An acid metal like plastic bronze resists corrosion but is not very strong. (3) Water strongly alkaline will in time dissolve the zinc or tin out of brass. Alum is a sulphate of alumina and its sulphuric acid will combine with the zinc in brass, especially if electric currents are present in the piping. Acids attack the zinc in brass preferably, but also the copper, tin and lead to some extent. If the acid to be dealt with is sulphuric, an alloy high in lead will withstand it best.—J. L. J.

Q.—We are desirous of manufacturing our own brazing solder.

A.—In order to make brazing solder a crucible furnace will be necessary. A forge fire might be made to answer, however, if the quantity required is not large. Equal parts of copper and bertha or horsehead zinc are used. Melt about 25 pounds of copper in a crucible and cover well with charcoal and salt or borax. Do not get the copper too hot. Add the zinc a little at a time without removing the crucible from the furnace. Cast into small ingots, heat red hot, break up with a hammer into small particles. These may be graded by passing through a sieve of different meshes. In manufacturing on a large scale the metal may be granulated by pouring from a height into a tank of water, the molten metal first striking a horizontal stream of considerable velocity.—J. L. J.

Q.—In going through a rolling mill recently we noticed the first process in making brass rod was that the metal was run into an iron mold. The mold was made in halves, which were quickly opened after the metal had been run in and they never had spongy castings or bad shaped castings. Why is not possible to make all brass castings in an iron mold?

A.—It is impossible to make all brass castings in iron molds for a number of reasons. The principal reason is that it would be impossible to run thin castings unless under pressure. The melting point of brass is so high that the life of an iron mold would be very short. Besides the cost of a complicated mold would be very great as a mold for finished white metal castings will cost from $100 upward. Attempts have been made to cast plain castings, like car brasses, in metal molds that resemble those used for making pressed glass articles, but they have not been very successful. —J. L. J.

Q.—Can you give me a mixture which is suitable for bib and cock work without the use of tin; or give me a mixture that will answer the purpose?

A.—The following mixture will be found suitable for bib and cock work:

Copper	70	parts.
Zinc	24	"
Tin	3	"
Lead	3	"

This mixture may be cheapened somewhat by making it from scrap, but if the tin is omitted it will not be satisfactory.—J. L. J.

Q.—We are making best white metal in Albany sand. Unless we put in ¼ pound of aluminum to a 60-pound pot it will not produce a smooth surface. When the work is finished the aluminum comes out in spots or cracks on the rag wheel. We would like a remedy.

A.—It requires considerable heat to thoroughly alloy aluminum with most white metals. The cracking on the rag wheel is no doubt due to coarse crystallization resulting from too slow cooling. The aluminum, when properly combined, no doubt causes the metal to set more quickly, with a fine and uniform grain. If it is found impossible to alloy the aluminum it may perhaps be omitted and cold pouring tried with chilling by nails or regular chills. —J. L. J.

Q.—We have a lot of dross from our white metal which is a mixture of 100 tin, 9 antimony and 2 copper. When we melt the dross down and try to cast the metal over again into siphon heads it cracks and does not fill out the mold properly.

A.—Break up the dross with a hammer and pick out the large bright pieces and run them down alone or add them to the new metal. The fine dross should be mixed with sawdust and added a little at a time to a bath of tin. Refine by boiling up with a piece of green hickory wood.—J. L. J.

Q.—We would like a formula for making finished castings. The metal is to be used in castings like transmitter fronts for telephones, and must finish and plate well.

A.—We would advise an alloy of zinc 85¼, copper 5¾, tin 6½ and aluminum 2½ pounds. The zinc should be of good quality and the alloy poured at such a heat that it will not give spongy castings. Castings that contain any pin holes will retain some of the plating solution which will ooze through the polish and cause black spots.—J. L. J.

Q.—Will you please give us a mixture suitable for brass fittings, such as ells and tees, but cheaper than "steam metal"?

A.—The following is known as the U. S. mixture for ells and tees:

Copper	80
Tin	2
Zinc	17
Lead	1

—J. L. J.

Q.—We use an acid resisting metal composed of 16 pounds of copper, 2½ pounds of tin and ½ pound of spelter. This is so tough we cannot machine it without chattering. Please give me a better alloy.

A.—We would advise the use of the following mixture:

Copper	80
Tin	17
Lead	3

This approximates the one you are using, but contains no zinc. The use of zinc in an acid metal should be avoided if possible. The mixture we recommend is used by a large meter works.—J. L. J.

MECHANICAL.

Q.—We would like to know the best lubricant to use in a draw bench for drawing copper tubes.

A.—A lubricant for drawing copper tubes we can recommend is composed of equal parts of lard oil and palm oil; this makes the best lubricant for all around work. For extra light tubes and fine finish palm oil only is used. A. W. L.

CHEMICAL.

Q.—We are sending you by this same mail a steel bezel. We wish to know if you can advise us the best manner to nickel this bezel so as to give us a fair finish.

A.—For this class of work the mechanical electroplating baths give the best and quickest results. By this method the articles are plated and polished at the same time. In the absence of a mechanical plating tank, the best method for you to pursue is to free the bezels from grease. (This can be accomplished by tumbling in sawdust.) Then polish by tumbling in the regular barrel with the aid of leather scraps and crocus powder, using but little of the powder. This should occupy 10 or 12 hours, when a good polished surface will be obtained. Remove and hang upon frames holding from one-half to a gross at a time. Cleanse lightly and then immerse in the nickel bath for 20 minutes to half an hour; remove, wash well and dry, and then polish by tumbling in macerated leather meal and a little Vienna lime for 5 or 10 minutes.—C. P.

Q.—I send you a sample coat hook. Kindly give me the formula for depositing the metal same as this; please give me full directions.

A.—The color upon the hook is termed bronze, but in reality is a low brass color. The best result obtained in depositing this finish is to use a solution at a temperature of 160 degrees and 4 to 5 volts. We have refinished the hook and used the following solution. If you desire to use a cold solution use only ¼ ounce carbonate of zinc to each gallon instead of ½ ounce.

Red copper compound	2	ozs.
Carbonate of zinc	½	"
Carbonate of soda	2½	"
Cyanide of potassium	4	"
Water	5	qrts.

To prepare the solution mix the carbonate of soda in one-half the water, which should be warm. Add the copper and zinc and dissolve the cyanide in the remaining water and mix well. Use cast anodes composed of 85 parts copper and 15 parts zinc. If the solution deposits uneven or a brass color add ½ ounce bisulphite of soda to each gallon. A good even color can be maintained by dipping in the regular bright dip considerably reduced with water after the articles are plated. To maintain the bath in condition and color add only copper dissolved in cyanide, 2 parts copper to 3 parts cyanide. Add a little bisulphite of soda at each replenishing. If the color becomes too red add a very little ammonia water; this method should keep the color if the current is regulated properly.—C. P.

Q.—We have a lot of chandeliers to refinish in ormolu satin finish and we are stuck.

A.—To produce the ormolu satin finish for chandelier work proceed as follows: Dissolve 12 ounces sheet zinc in 1 gallon pale aqua fortis and to this add 1 gallon oil of vitriol; mix thoroughly and allow to stand for some hours. Remove the lacquer from the chandelier parts, bright dip in the usual manner and immerse in the satin dip for several minutes. Remove, wash, pass through the potash, shake well and pass rapidly through the bright dip. If the color is satisfactory dry out in the usual manner and lacquer with a satin dip lacquer. If the ormolu dip does not satin immediately add a few ounces of water; if too smooth add 1 to 2 ounces muriatic acid to each gallon of the mixed acids; if too rough add more oil of vitriol, or until sufficiently smooth. Keep the dip well stirred up and as the solution gets older it may be necessary to place it in a hot water bath to cause rapid action.

Q.—I want to regain the silver in a solution. Please tell me how to precipitate it.

A.—Precipitate the silver with muriatic acid. When all has been thrown down siphon the remaining solution, and from the residue wash the precipitate and use it in preparing a new bath.—C. H. P.

Q.—We send a sample made of Britannia metal which has been run through a black current solution, and relieved, which gives a silver oxidize effect. Please let us know how this is done.

A.—An imitation oxidized silver effect upon Britannia metal can be produced with the following solution:

Single sulphate of nickel	8	ozs.
Sal ammoniac	4	"
Sulpho cyanide of potassium	4	"
Sulphate of zinc	1	"
Water	1	gal.

Use a part of the water hot for solution of the chemicals. When prepared add sufficient water ammonia to produce a bluish tinge to the solution; probably 1 ounce to the gallon will be sufficient. The solution should be used exactly as a nickel one with nickel anodes and be maintained slightly warm—110 degrees will do. The articles should be cleaned in the regular manner and placed in the solution for a few seconds, using a slight motion. When sufficiently black remove, wash and relieve the high lights with pumice stone, and dry out in the usual manner. Then dip lacquer with a good body lacquer. Your sample was refinished in this way.—C. H. P.

Q.—I am having trouble with my silver solution. It became poor in silver some time ago and I cut down and made chloride of silver and put it in. It began to act badly at once, and the work came out all colors—dark and bright in spots, or the whole knife or fork would be purple or black. The forks would also blister between the tines.

A.—Your solution is apparently still deficient in silver; however, to be sure of this remove a pint or quart and put in it ¼ ounce nitrate of silver dissolved in a little warm water. Stir constantly while adding this. If the solution absorbs the silver nitrate rapidly, it shows it needs metal, and then add ½ ounce nitrate of silver, previously dissolved in water, to each gallon of solution. Your solution will then become normal. If, on the other hand, the solution refuses to absorb the silver nitrate, add ¼ ounce of 3 per cent. hydrocyanic acid to each gallon and ½ ounce cyanide of potassium. The acid will neutralize the free alkali and the addition of cyanide will give you sufficient freedom for proper working of the solution.—C. H. P.

Q.—I want a silver dip or electro-deposit of silver on wax. I do not want graphite or gold plate. The deposit must be very thin, as I want to plate with nickel afterward.

A.—Take 1 ounce nitrate of silver and dissolve in 1 quart of pure water; acidulate slightly with nitric acid. Put in a piece of metallic copper suspended by a copper wire and the silver will be precipitated as a brownish gray powder. When there seems to be no more silver in solution, decant the liquor and wash the powder thoroughly until it shows no reaction with blue litmus paper. The liquor and washing should be treated with salt to recover whatever silver may be left in the solution. Now take the powder and put it on filter paper and let it dry with dry air heat. When dry sift through an ordinary tea strainer. Use this powder as you would graphite. You can plate silver directly upon this.—C. H. P.

Q.—(1) Kindly inform me the best way to remove nickel plate from iron articles—I mean articles that from their nature cannot be polished off. (2) I also want a nice brown on brass.

A.—(1) You can use for this purpose an acid solution consisting of oil of vitriol 1 gallon, aqua fortis 1 quart and water 1 quart. This acts very rapidly and the articles should be watched to avoid pitting of the surface. Another method is to prepare a good strong solution of cyanide of potassium in water, say from 20 to 25 degrees baume and if possible use an iron tank and heat the solution. Connect the negative wires of your dynamo to the tank and the positive or anode wire to the articles to be stripped, using a strong current. By this method articles should be uniformly stripped in a few minutes. (2) To produce a Barbedienne brown proceed as follows: In 1 gallon of water dissolve 4 ounces of caustic soda, 1 ounce red or yellow sulphide of antimony and ¼ ounce sulphuret of potassium; use this hot. Polish your work equal to a cut-down finish with tripoli; then cleanse and scratch brush with a fine brass wire brush, using a little sal soda in the brush water. Immerse in the bronze solution for a few seconds; remove, wash and dry and then re-brush dry. If the color is not deep enough pass rapidly through the solution again; wash, dry out in the regular manner and dip or brush lacquer. Let us know the result of your work.—C. P.

Y.—Will you give me an oxidizing solution that will give a fine blue black color, both on sterling and fine silver? I prefer a dipping solution—one that I can heat. I have tried iron sulphate and platinum and others, but without good results; they lose their strength too quickly.

A.—One of the best methods for producing a blue black color on sterling silver and plated goods is the one prescribed by Charles H. Proctor, entitled "Oxidized Silver and French Gray." This can be found on page 68, April, 1905, issue of The Metal Industry. Another method is to prepare a solution of caustic soda in boiling hot water standing from 8 to 10 degrees Baume. Then add as much pulverized sulphur as the solution will absorb. Use cold. Articles for the gun metal finish should be slightly coppered in a cyanide of copper bath and then immersed until sufficiently colored. To bring up the lustre scratch brush with a soft fine brass wire machine scratch brush, using a little sal soda. Dry out and lacquer in the usual manner.—C. P.

Q.—I am running a 75-gallon bath and would like to know how much soda should be added to make the deposit stay red. I am having considerable trouble with my copper peeling when plating steel bands. It works well otherwise.

A.—The trouble you are experiencing is due to an excess of free cyanide; this does not affect the deposit when plating brass, but causes the deposit to oftentimes peel or blister when upon steel. Add about 5 pounds of bisulphite of soda to the bath; this will improve the color and give you a brighter deposit and will probably overcome the blistering.—C. P.

Q.—What can I do for my copper plate as my work comes up a dirty gray? I have put cyanide into it, but perhaps have put too much, as the work will come up clean for a couple of days, and then get gray again.

A.—Do not use so much free cyanide in your solution. A copper bath runs better when it shows a very faint bluish tint; it shows then that it contains but little free cyanide and it is then very easy to correct by adding not more than ¼ to ½ ounce of cyanide to the gallon. Try adding 1 ounce hyposulphite of soda to each 50 gallons of solution; this will remove the gray tone and give you a better color.—C. P.

Q.—Will you give me a formula for oxidizing silver, to be applied with a brush? I don't want liver of sulphur.

A.—Hydrosulphuret of ammonium painted upon the surface of the silver will oxidize it very rapidly, especially if the articles have been warmed by passing them through boiling water and then applying the solution. Another method is to prepare a solution consisting of 6 ounces each of sulphate of copper, sal ammoniac and saltpetre, dissolved in 1 quart of boiling water and applied in the same way as the above.—C. P.

METALLURGICAL DIGEST

A REVIEW OF METALLURGICAL MATTERS OF THE WORLD.
TRANSLATED AND EDITED BY HOWARD GREEN BAYLES, MET. E.

METAL ETCHING.

Translated from Der Metallarbeiter

By Howard G. Bayles.

Etching consists in producing a desired design on metal articles by the use of an acid or chemical solution. In "deep etching," the design is eaten away and its surface lowered by the action of the solution. In relief work, or "high etching" (we render the German terms literally), the background is etched and the design is left untouched.

ACID TO USE.

In order to do work of either class, it is necessary first of all to know which acids and acid mixtures are best adapted for use with the different metals and alloys. For iron and steel dilute nitric acid is most often used, in strengths varying from one in four to one in eight. The more dilute solution is used for etching delicate lines, and frequently has added to it a small amount of silver nitrate (lunar caustic). Nitric acid attacks all common metals except gold and platinum and earned its old name of "aqua fortis" from the fact that by its use gold and silver could be parted when alloyed. The silver salt is not added when silver is to be etched, and for "deep etching" on this metal a stronger solution is ordinarily used, half acid and half water being best.

Chromic acid is also used for iron and steel as well as for copper. Professor Kick recommends the following mixture:

1 part antimony chloride.
6 parts hydrochloric acid.
1 part water.

For the uniform or smooth etching of a surface, it is usual to employ more dilute solutions.

Another good etching solution consists of

15 parts corrosive sublimate.
1 part tartaric acid.
420 parts water.
½ part nitric acid.

If iron and steel articles of very irregular shape are to be etched, a good solution is made as follows:

1 part crushed charcoal.
2 parts green vitriol (iron sulphate).
2 " sal-ammoniac.
Enough triple vinegar.

As a protective coating for the parts that are not to be etched, a paste of finely ground red lead and linseed oil serves very well. It should be laid on about ¼ inch thick and the article warmed until the paste has become quite dry and hard.

MATTE DESIGNS.

In order to produce matte designs on a brightly polished steel surface (as sword blades, for example), the design is traced out by means of etching tool and the etching done by means of hydrochloric acid gas. This is made by heating a mixture of common salt and concentrated sulphuric acid.

For copper, it is most usual to employ nitric acid diluted with water to a density of 18° Beaumé or else iron chloride solution of 35-40° B. density. There are many methods in use for copper etching, but it is by far the best plan for a workman to select one that has been proved by experience, and to adhere to that one alone. Otherwise he will not so readily attain that familiarity with every step of his process that is essential for the best work.

Dr. Böttger recommends an etching solution made as follows: 2 parts of chlorate of potash in 20 parts of boiling water. After cooling, this is mixed with 10 parts of hydrochloric acid previously diluted in 70 parts of water. This solution may be made in quantity and kept until needed. For very fine work, it should be again diluted with an equal volume of water. This solution gives sharp contours and may be used equally well for copper, brass, bronze and German silver. If copper or a copper alloy is simply to be given a matte surface, it may be done by a short dip in a mixture of

200 parts nitric acid.
100 " sulphuric acid.
1 " common salt.
5 " zinc sulphate.

ZINC ETCHING.

For zinc etching, nitric acid is used in varying degrees of concentration. For "high etching" or relief work, Dr. Böttger recommends the following method:

One part of platinic chloride and 1 part of gum arabic are dissolved in 12 parts of water. This is applied to the lines or pattern to be protected, on the carefully cleaned zinc surface by means of a fine goose quill. A deposit of metallic platinum is formed, which shows black on the zinc surface. In a short time the design is quite dry. It is rinsed with water and placed for a few minutes in a solution of potassium auro-cyanide, until a thin deposit of metallic gold has formed on its surface. The article is next placed in a bath of very dilute nitric acid (1 in 16) and gone over very lightly with a soft brush. The gold adheres to the platinum design, but brushes from the rest of the surface. Thus the design is protected against acid action.

TIN ETCHING.

Tin is ordinarily etched either with nitric acid or aqua regia (1 part nitric acid and 2 to 4 parts hydrochloric acid). Tin is oxidized by nitric acid, and the resulting oxide is not appreciably soluble in the acid. For this reason it is necessary to remoxe this oxide from time to time with a brush. A solution of ferric chloride may also be used for etching tin.

Silver and gold are not commonly etched in ordinary metal work. In the case of the former it may be done by means of nitric acid and in the latter case by aqua regia. Nitric acid may be used also for etching lead and Britannia metal, the degree of concentration being a matter for experiment on each class of work.

(*To be continued.*)

The proposed metal exchange in Berlin covering copper, zinc, lead and tin is progressing favorably. The committee having the matter in charge met on October 14 and presented a report outlining the plans. While a majority of those present favored an exchange covering the metals mentioned, some thought the exchange should only deal with zinc, of which metal Germany is a large producer. It was the opinion that such an exchange would act as a corrective to the wild speculation of the London and other foreign exchanges.

Associations and Societies

REPORTS OF THE PROCEEDINGS OF THE METAL TRADES ORGANIZATIONS.

NATIONAL ASSOCIATION OF BRASS MANUFACTURERS. President, A. S. Hills, Haydenville, Mass. Commissioner, Wm. M. Webster, 109 Randolph street, Chicago, Ill.

At the recent meeting of this association held at the Hotel Astor, New York City, December 11 and 12, those attending were generally of an optimistic turn of mind and felt that the restoration of confidence and trade was only a matter of a short time, say 30 or 60 days. The general opinion was that the future outlook for business was good. The meeting was well attended. A specially prepared paper by Jesse L. Jones, metallurgist of the Westinghouse Company, on "Wanted—A Brass Foundry Foreman," was read. After the election of the following officers the meeting adjourned to meet in Buffalo March 18-19, 1908:

President, A. S. Hills, Haydenville, Mass. Trustees—E. F. Niedecken, Milwaukee, Wis.; E. L. Strauss, Cleveland, O.; J. W. Sharp, Philadelphia, Pa.; E. J. Seitz, St. Paul, Minn.; E. C. Regester, Baltimore, Md.; H. M. Hoelscher, Chicago, Ill. Members National Committee—For the East, A. S. Hills, Haydenville, Mass.; for the West, J. J. Ryan, Chicago, Ill.

AMERICAN BRASS FOUNDERS' ASSOCIATION.—President, Charles J. Caley, New Britain, Conn.; Secretary, Andrew M. Fairlie, McCays, Tenn.; Treasurer, John H. Sheeler, Philadelphia, Pa.

The American Brass Founders' Association has in the short space of seven months and in the face of adverse circumstances established itself as a technical society that will endure.

Organized in May, 1907, at the Philadelphia Convention of the American Foundrymen's Association and under the auspices of that body, the Brass Founders' Association began its first fiscal year on July 1, with a charter membership of fifty. Almost immediately thereafter began a renewal of the decline in prices of securities, which culminated in the financial crisis still upon us, so disastrous to the progress of all lines of business. Nevertheless the American Brass Founders' Association continued to forge ahead, and on Dec. 16, 1907, the society had a total enrolment of 111 members, whose dues were paid. These members represent the Dominion of Canada, and sixteen States, viz.: New York, New Jersey, Illinois, Connecticut, Pennsylvania, Michigan, Minnesota, Ohio, Massachusetts, Wisconsin, Tennessee, Rhode Island, Maryland, Iowa, Delaware and Kentucky.

The significance of this success, contrasted with contemporaneous retrenchment and set-backs in the business world, is simply that the American Brass Founders' Association fills a gap which was known to exist—that those interested in the non-ferrous metal industries are determined, whatever happens, to seize this opportunity to band themselves together for their industrial education.

Although the name of the association might mislead some, the constitution has been intelligently interpreted, and the members comprise not only brass founders, but also manufacturers of metallic goods, metal producers, aluminum workers, supply men, and platers and polishers. It is hoped that the platers and polishers will within a year or two become sufficiently numerous as members of the Brass Association to form a separate organization; and with this end in view they are rallying under the standard of the American Brass Founders' Association, knowing that in the meantime their interests will be cared for.

The society will continue to thrive, and those who contemplate joining are urged to communicate, without waiting for an individual invitation, with the secretary. Copies of the constitution and blank application will be gladly furnished on request.

ANDREW M. FAIRLIE, Secretary,
P. O. Box 197,
McCays, Tenn.

PERSONALS

ITEMS OF INTEREST TO THE INDIVIDUAL.

George E. Tyson, superintendent of the Reading Hardware Company, Reading, Pa., has resigned from that position after having served for a number of years.

Horace Richardson, treasurer of the Taunton Crucible Company, Taunton, Mass., states that the report that he was to resign from his position is not true and he has no idea of taking such action.

Hard times has not come to all of the platers, for L. G. Delamothe, who recently went to the State of Washington to metallize flowers and leaves and other objects of nature, reports that to fill his orders he has had to work until 10 o'clock every night.

E. DuVivier, 14 Church street, New York City, American representative for Jules Richard of France, manufacturer of pyrometers, voltmeters, ammeters and other measuring instruments, has gone on an extended tour of the country as far as San Francisco.

C. H. Fries has become associated with the Philadelphia Tramrail Company as sales agent, offices, 1,009 Drexel Building, Philadelphia, Pa. Mr. Fries was formerly in the employ of the Randall Tramrail Company an dthen the Moyer Terminal Company, both of Philadelphia.

The annual meeting of the Fairfield Aluminum Foundry Company, of Fairfield, Conn., resulted in the election of the following officers: Stephen A. Banks, president and treasurer; John H. Robinson, vice-president and general manager, and Fred T. Robinson, secretary. The affairs of the company are in a satisfactory condition.

Dr. Richard Moldenke, secretary of the American Foundrymen's Association, has just returned from an extended tour in the interest of the Government, making a study of the coke industry of this country. The doctor will write a report which will be published by the U. S. Geological Survey early this year. Further, most of the data will be presented at the Toronto meeting of the Foundrymen's Association.

Thomas Devlin, president of the Thomas Devlin Manufacturing Company, of Philadelphia, Pa., has just returned from an extended trip abroad with his wife and two youngest sons. The party spent six weeks traveling through old England, Paris, and Scotland, and the balance of the time was passed in Ireland. The trip was taken as a well-deserved rest after fifty-three years as a manufacturer of hardware and malleable iron.

William Selfridge has been elected president of the Philadelphia Roll and Machine Company in place of William Wharton,

Jr., who died on November 26, and August Marx, who was formerly superintendent, has been appointed general manager. The office and the plant of the company is at 23rd street and Washington avenue, Philadelphia, where they have extensive works and manufacture machinery and rolls for the fabrication of metals.

Many New England users of crucibles have met A. L. Haasis, who has been selling melting pots for a number of years. He recently impressed his personality on the trade by issuing a unique letter which, being in his own handwriting, was somewhat difficult to read, but when deciphered was worth reading. New England foundrymen know that Mr. Haasis sells crucibles, but not all are aware that he is also an art collector and has his Brooklyn home filled from cellar to garret with oil paintings, blue china and old silver. He is an enthusiastic collector and spends all of his spare time at his home arranging his art pets.

In the report of the directors meeting of the Michigan Copper & Brass Company, Detroit, Mich., mentioned on page 378 of our December issue, the name of James T. Whitehead was omitted from the list of directors through a typographical error. Some new members in the personnel of this company are John Tyler and Harry Higgins and A. G. Dallas. Mr. Tyler and Mr. Higgins were formerly superintendent and assistant superintendent of the Chicago Brass Company, and will become assistant superintendents with the Michigan Company. Mr. Dallas was at one time the treasurer of the Chicago Brass Company and before that was manager of the Chicago store of the Benedict & Burnham Manufacturing Company. He will manage the Chicago store of the Michigan Copper & Brass Company, and will be assisted by his son, Donald Dallas.

DEATHS.

WILLIAM F. RENZIEHAUSEN.

William F. Renziehausen, head of the house of Wm. F. Renziehausen Company, gold and silver refiners, of 43 Oliver street, Newark, N. J., died of pneumonia at his home in Newark on December 9.

Mr. Renziehausen was born in Osnerbruck, Germany, on June 20, 1839. The early part of his life was spent as an overseer of a large estate near Hanover, Germany. He came to this country in 1886 and soon after arriving went to Florida and started an orange grove, and remained in Florida six or seven years. He then went to New York and formed the jewelry firm of Henze & Renziehausen, at 28 Bond street, later going in the silver business with his father-in-law, Edward Beiderhase. After the death of Mr. Beiderhase he closed up that business and went into the gold and silver refining business on John street, New York City. About twenty-five years ago he went to Newark, N. J., and was with Glorieux & Woosley until June, 1894, when the corporation of Wm. F. Renziehausen Company was founded at 912 Broad street, later being removed to the present quarters at 43 Oliver street. Mr. Renziehausen held the position of treasurer of the company until the time of his death. He is survived by a widow, one son, Lieutenant Wm. B. Renziehausen, of the 4th U. S. Cavalry, and one daughter, Mrs. Samuel S. Yardley, of East Orange, N. J.

At a meeting of the stockholders, immediately following the death of Mr. Renziehausen, the following officers were elected: Thomas Lee Terry was made president of the corporation; Farnham Yardley, vice-president; G. M. Leigh, secretary, and Samuel S. Yardley, treasurer. The board of directors remains the same, and the business will be conducted in the same manner.

William Wharton, Jr., died at his home, Germantown, Philadelphia, Pa., November 26. He was 78 years old and was president of the Philadelphia Roll and Machine Company of Philadelphia, builders of rolls for brass and copper mills, and of the William Wharton, Jr., Railway Supply Company. Like his brother, Joseph Wharton, he was always identified with the iron industry and had invented many appliances used in the street railway systems.

GEORGE JACKSON HUMBERT.

George Jackson Humbert died at his residence in South Connellsville, Pa., on December 11, 1907, after an illness of about seven weeks.

Mr. Humbert was born in Pittsburg September 17, 1858, and was of German and English descent, his forbears being among the early settlers of the State. He was educated in the public schools. At the age of 13 he was thrown on his resources and sold papers on the streets; afterward he worked in a brickyard and in the stockyards as clerk. At the age of 20 he went into the service of the Pittsburg & Bessemer Steel Company and in 1880 was assistant manager. At the close of that year he took charge of the Bessemer department of the Colorado Iron & Steel Company, at Pueblo, Col. He returned to Pittsburg in 1886 and again began at the bottom of the ladder as a laborer in the old Schoenberger Mill. Early in 1888 he was tendered the

GEORGE JACKSON HUMBERT.

position of superintendent of the Glasgow Iron Company's plant at Pottstown, Pa. Afterward he superintended the erection of the Bessemer plant for the Chester Rolling Mill Company and then built the open hearth steel casting plant for the Norristown Steel Company, of which company he was general manager and vice-president until it was merged with the American Steel Casting Company.

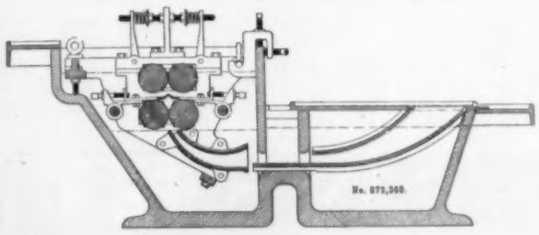
He went to Connellsville in May, 1895, bought 267 acres of land and started the construction of the Humbert tin plate plant in South Connellsville. This mill was operated successfully until it was merged with the American Tin Plate Company, in 1898. After serving as district manager for the American Tin Plate Company, Mr. Humbert severed his business connections and devoted his attention to a process for coating steel sheets with a non-rusting mixture of aluminum and other metals and the last years of his life were devoted to this work. Amid all this activity he found time to build the Morgantown, W. Va., tin plate plant and to negotiate the sale of the Ursina coal property, with the operation of which he was at one time identified.

Mr. Humbert was a leading spirit in the upbuilding of Connellsville and contributed more than any other man to that end. While not always fortunate he was always forceful, energetic, enterprising and honest.

PATENTS

REVIEW OF CURRENT PATENTS OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

872,368. December 3, 1907. Coating Apparatus. Edgar G. Porter and John I. Jones, assignors to American Sheet & Tin Plate Company, of Pittsburg, Pa. This invention relates to the tinning or coating of metal sheets with another metal and is

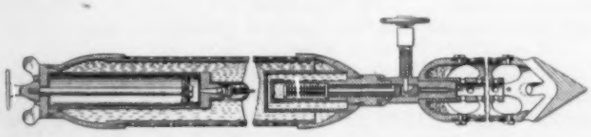


designed to provide an improved device for regulating the thickness of the coating. It is also designed to provide means whereby the sheets may be tinned more rapidly than formerly, thus increasing the output of the tinning machine. In this machine scraping knives are employed to remove the surplus tin.

872,092. November 26, 1907. Process for Detinning and Recovering Merchantable Iron from Tin Plate Scrap. Elmer A. Sperry, Brooklyn, N. Y. This invention relates to the detinning of scrap and especially to the preparation, handling and manipulation of the scrap, and also the treatment of the black scrap after the detinning process has been accomplished. Some of the steps of this method are equally applicable to any process of detinning.

871,812. November 26, 1907. Foundry Drying Stove. Daniel McNiel, of Glenorkney, Manitoba, Canada. This invention relates to foundry drying stoves and has for its object to provide a seal joint between the door and the roof by fitting on the door a dip plate arranged to dip into a sand trough carried by the roof. The front beam of the roof is provided with a trough holding sand into which dips a plate fastened to the back of the door near its upper edge.

874,861. December 24, 1907. Soldering Iron. Raymond Pockman, of Yolo, Cal. This iron is provided with a reservoir for the liquid fuel and also with devices for gasifying the fuel so



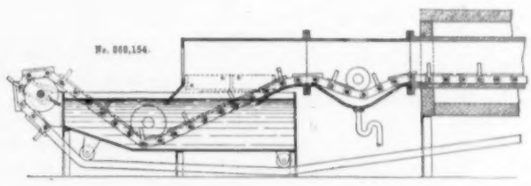
that the gas may be burned with a Bunsen flame to heat the iron. The fuel is forced from the reservoir into a generator tube which is heated so as to cause the fuel to be transformed into gas. From here the gas passes to the burner for heating the iron.

872,966. December 3, 1907. Buffing or Polishing Wheel. William A. Painter, Allegheny, Pa. This improved buffing or polishing wheel is made of muslin, cotton cloth, canvas, or felt. The invention provides a wheel of substantially the same thickness throughout, and one which is simple to assemble and operate, and one which also possesses more durable wearing qualities than wheels of this class as hitherto made. The material is so folded as to produce a cross-cutting or diagonal surface of the cloth in different directions. The mesh of the fabric crossing each other prevents the material from pulling out or fraying on the exposed edges of the pieces.

873,997. December 17, 1907. Rolling Mill. Emil Ebinghaus and Albert Schumacher, of Gevelsberg, Germany. This invention relates to improvements in rolling mills for making small articles such as railing heads, studs, keys, and the like. It consists in the combination of a continuously revolving roller with a movable slide which moves to and fro in regular order, and which forms the counter mold for the revolving roller.

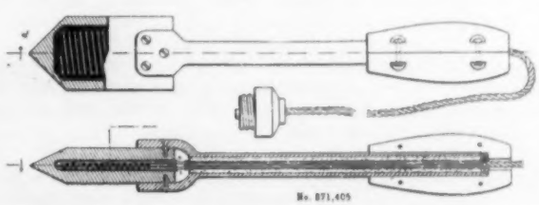
874,035. December 17, 1907. Multiple Spindle Automatic Turret Machine. George D. Prentice, New Haven, Conn. In this machine there are a number of tools mounted for simultaneous operation, and toward which a number of stock pieces are advanced for the operation of the tools. One of the tools may be advanced to meet the stock and if this is a threading tool the sum of its advance and that of the stock while they are in working engagement will be the advance of the thread cut upon the stock.

868,154. October 15, 1907. Annealing or Heating of Metals. Darwin Bates and George Wordsworth Peard, Huyton, Eng. This invention refers primarily to the annealing or heating of metals, particularly hollow articles. Upon reference to the drawing it will be seen that the furnace portion of the device re-



ceives the articles after they have passed through a liquid seal. During the passage of the articles through the first chamber they take up some of the liquid and this must be got rid of, otherwise it would be conveyed into the annealing or heating chamber or retort. Should this take place the liquid would have to be evaporated before the annealing could take place. This would obviously result in uneven and unequal treatment of the different articles and would cause waste of fuel and render the operation slow. The object of using a sealed chamber is to prevent the articles having bright surfaces from becoming discolored. A conveyor carries the articles from one chamber to the other, and during the passage they are caused to empty themselves of any water or liquid they may have taken up in passing the seal, prior to their actual entry into the annealing chamber.

871,405. November 19, 1907. Electrically Heated Soldering Iron. H. Hertzberg and M. J. Wohl, assignors to A. A. Low, of Horseshoe, N. Y. In this soldering iron the parts included



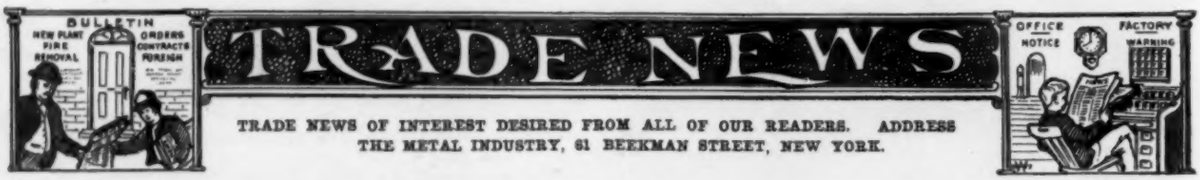
in the electric circuit are thoroughly protected and insulated. The shank and handle portion of the device are constructed to obviate loss of heat by radiation, and to prevent the handle becoming too hot for use.

871,685. November 19, 1907. PROCESS OF APPLYING A COATING OF ONE METAL TO THE SURFACE OF ANOTHER METAL. Anton Freier, assignor to the Holtzer Cabot Electric Company, a corporation of Massachusetts. This is especially intended for applying a platinum coating to an electric contact point. It may, however, be applied wherever it is desired to apply a thin coating of one material to a portion of the surface of another.

873,508. December 10, 1907. ELECTRODEPOSITION OF COPPER AND OTHER METALS. Sherard Osborn Cowper-Coles, London, Eng. In carrying out this invention the solution from which the metal is to be deposited is brought continuously into intimate contact with air and in some cases also with strong light so as to maintain it in the oxidized state, the solution being freed from air by any of the usual methods. To this end the solution or electrolyte is conveyed through an atomizer consisting of revolving vanes which throw the solution from them in the form of a fine spray against an outer casing so that the impurities held in suspension are projected against the walls of the casing and gravitate to a sludge box.

867,030. September 24, 1907. CAN BODY FORMING AND SOLDERING MACHINE. George Gardner, Yarraville, Victoria, Australia. In this machine the can bodies are formed and soldered by a continuous series of operations, from flat sheet metal blanks. The blanks pass through the machine and are subjected to successive operations until finally discharged finished.

868,185. October 15, 1907. APPARATUS FOR THE HEAT TREATMENT OF METALS. Theophilus Vaughan Hughes, of Birmingham, Eng. This apparatus is so constructed that it is possible to submit metallic articles to the action of heat in an atmosphere of non-oxidizing or other gas without passing them through liquid seals or quenching tanks. The device also affects a preheating of the gas supply whereby the said atmosphere is maintained. The articles are conveyed through the heat treatment chamber and cooling chamber by means of an endless conveyor chain fitted with suitable trays or boxes, or a screw may be used for this purpose and slide the boxes along suitable guide rails. This may be operated continuously or intermittently.



TRADE NEWS OF INTEREST DESIRED FROM ALL OF OUR READERS. ADDRESS THE METAL INDUSTRY, 61 BEEKMAN STREET, NEW YORK.

A new sand blast is offered to the trade by Leiman Bros., 141 Centre street, New York.

The Sterling Graphite Company, of Chester Springs, Pa., have secured a contract by which their entire production of graphite is sold until January 2, 1909.

John K. Judd, receiver for the Barlow Manufacturing Company, Holyoke, Mass., reports that the company is doing business the same as ever and ready for more.

It is reported that the Brainard & Wilson Company, manufacturers of novelties, at Danbury, Conn., are planning to add a plating department for silver deposit work.

Phosphorus, hydrofluoric acid and tri-sodium phosphate are three products of use to metal workers manufactured by the General Chemical Company, 608 Bourse, Philadelphia, Pa.

A new jobbing brass foundry, known as the Hudson, has been established at 799 Greenwich street, New York. They make brass, bronze and composition castings of every description.

E. E. Steiner, formerly at 50 Ferry street, Newark, N. J., manufacturer of portable ovens, has moved to 58 Union street, where he has larger space and greater facilities for doing work.

The Gilmer Company, of Philadelphia, Pa., announce that they are able to fill on short notice orders for polishing belts and tape of all kinds. They make to order belts of any width or thickness.

The Crescent Phosphorized Metal Company, of Philadelphia, Pa., announce that they manufacture high grade phosphor tin, phosphor bronze and phosphor copper containing up to 15 per cent. of phosphorus.

A firm that has sold metals for 95 years is Richards & Co., of 200 Causeway street, Boston, Mass. They carry a very large stock of metals—every kind the founder needs—and are ready to supply them at short notice.

The brass foundry at 73 Hamilton street, Newark, N. J., formerly conducted by Miles Sweeney, has been sold to Charles Redlinghouse. The new owner has started in with some new orders and his outlook is very promising.

The American Wire Brush Company, 25 Broad street, New York City, are extending their line of brushes, making circular brushes and others used in the polishing and plating trades. Heretofore the firm have only made foundry brushes.

E. Schneider, 298 South street, Newark, N. J., smelter and refiner of gold and silver, has been compelled by increase of business to enlarge his plant by an addition. He has received some very large orders for photographic materials.

The Reed magnetic metal separator is now sold by R. Parson & Co., Twenty-third and Hamilton streets, Philadelphia, Pa. The firm are also machinists and millwrights and manufacturers of special machinery and metal novelties.

William H. Bristol, manufacturer of pyrometers, has occupied his new factory at Jersey City, N. J., since January 1st. The manufacturing and testing will be conducted at the plant, and the main office will remain at 45 Vesey street, New York City.

The Cleveland Platers' Supply Company, 113 Saint Clair avenue, N. E., of Cleveland, Ohio, have acquired the sales agency of the electric cleaning compound formerly manufactured and sold by the Imperial Chemical Company of the some city.

I. I. Shonberg has purchased the rolling mill portion of the business of I. Shonberg, 363 Hudson avenue, Brooklyn, N. Y. The new proprietor is fully equipped to execute promptly rolling mill orders for the trade and makes a specialty of music plates.

The Monarch Engineering and Manufacturing Company, of Baltimore, Md., builders of the "Steele-Harvey" crucible brass melting furnace, have put out a business forecast for 1908 which makes interesting reading. Particulars will be found on another page.

The Brass Founders Supply Company, of Newark, N. J., announce that they make all types and sizes of the ribbed flasks which are absolutely interchangeable with the best design and highest efficiency. They also sell the complete equipment for a modern brass foundry.

R. F. Lang, manufacturers' agent and importer of royal phosphor copper, has removed his offices to 31 Broadway, New York. Mr. Lang reports that his imported product, which guarantees 10 and 15 per cent. phoshorous, is received by the trade with satisfaction and approval.

The F. B. Shuster Company, of New Haven, Conn., offer a foot lever and power sprue cutter which the company says soon pays for itself in time and labor. They also make wire straight-

ening and riveting machinery. Their Catalog M gives a description of their machine tools.

The Crescent Phosphorized Metal Company, of 2,314 Wood street, Philadelphia, Pa., report that they have no connections with the Willard Supply Company of the same address, simply furnishing them with phosphor copper in the same way and on the same terms that they are selling to other customers.

The W. W. Sly Manufacturing Company, of Cleveland, Ohio, builders of foundry equipment, state that they make steel exhaust mills to clean castings weighing from one ounce to two tons. They assert they are the best and cheapest in the world, full particulars for which will be found in their Catalog M.

Chas. F. L'Hommedieu & Sons Company, 99-101 South Clinton street, Chicago, Ill., announce that their Reliance Plating Dynamo which they manufacture is giving excellent results. It has slow speed, compound or shunt wound and will not heat or spark. This firm are also manufacturers and dealers of plating and polishing supplies of every description.

The Ellwood Ivins Tube Works, Oak Lane Station, Philadelphia, Pa., have increased their limit of size in seamless steel tubes to three inches in diameter. They formerly only made up to two inches. They report that they have sold their product ahead for over three months. They now produce steel tubes from 1/64 inch to 3 inches in diameter, with maximum walls of 3/8 of an inch thick.

A reward of $25 is offered by the New Era Lustre Company, of New Haven, Conn., under the following conditions: $15 for the best sample of work finished with either their brilliant AA1 or No. 2 brush lacquer; $10 for a sample finished with any other lacquer which excels their goods. Samples of the lacquered work should be mailed to the company, and further particulars of the reward will be found on another page.

The Baird Machine Company, of Oakville, Conn., announce that they are especially equipped with the facilities and the experience to build the most complicated wire and sheet metal forming machinery for the working of wire and sheet metal. Their factory has been enlarged and re-equipped several times in recent years. Besides their wire forming machine, the company make the celebrated Baird oblique tilting tumbling barrels.

An announcement is made on another page by the Farrel Foundry & Machine Company, of Ansonia, Conn., of the variety of machinery they build for rolling mills, which includes 8 sizes of alligator shears, gate shears, cinder grinders, sheet metal straighteners, roll grinding machines, railroad cranes, cabbaging presses and lead pipe machinery, besides patented coil friction clutches, gearing—cut, machine moulded, pedestals, couplings, etc.

A product of E. B. Badger & Sons Company, 63 Pitts street, Boston, Mass., is the Badger copper steam jacket kettles, which are made to stand pressures running from 80 to 110 pounds. The kettles are described in their catalog M. The firm also manufactures the famous Badger fire extinguisher. Fire extinguishers are indispensable accessories to factories that do not wish to be burned down to the ground.

The Badger Brass Manufacturing Company have no intention of abandoning their Kenosha, Wis., factory so far as the manufacture of automobile lamps is concerned. They will, however, do most of the lampmakers' work on their product which requires that class of work in their factory, which they have established in New York City. At this factory they expect to turn out all of their product manufactured by the machine process and the Kenosha factory will furnish the parts necessary.

The Newark Brass Plate Engraving Company has been organized and established a plant at 45 Lawrence street, Newark, N. J., to manufacture name plates, dials and scale plates of all descriptions. The use of etched plates is extending rapidly and the samples of the work from the Newark Company sent to THE METAL INDUSTRY office are fine specimens of etched plate. The organizer of the Newark Brass Plate Engraving Company is James N. Morehouse, who is a Newark plater of considerable experience and reputation.

On another page will be found the announcement of the Waterbury-Farrel Foundry & Machine Company, of Waterbury, Conn., showing the picture of their works and mentioning the fourteen different illustrated catalogues issued by this firm. They make about all of the different kinds of machinery used in rolling mills, cutting-up shops and foundries. All kinds of machinery for working cast and sheet metals. They will have ready by January 15 the new section G of their catalog, which describes tube and rod mill machinery.

The well-known tool and supply business of the F. W. Gesswein Company, 39 John street, New York, was changed on January 1st to William Dixon, incorporated. The business was established in 1868 and at one time the firm name was Gesswein and Reichhelm, and then changed to F. W. Gesswein Company. Upon Mr. Gesswein's death in 1899 William Dixon was made executor and continued the business, and it will now be conducted as mentioned above in his name. Besides selling jewelers' supplies, the firm manufactures several of its own products, such as brushes and polishing materials.

Russell & Erwin Manufacturing Company, for more than 40 years at 43-47 Chambers street, New York City, have moved to their new six-story fireproof building at 94-98 Lafayette street. This building has been erected especially to meet their requirements and is provided throughout with all the modern facilities for the handling of goods. The main entrance is on Lafayette street, the shipping department being on Walker street, where there is a special driveway into the building and platforms for loading. The building is equipped with high-speed elevators as well as belt conveyors. The showroom is in the rear of the offices on the main floor.

The Aluminum Manufacturing Company, of Two Rivers, Wis., have finished a strictly fireproof two-story concrete and steel building, 45x160, which was very much needed, as their plant had been overcrowded. The company have also extended their power plant and have installed a suction gas engine, which is reported to be a great saving in fuel. They have put in an annealing oven and melting furnace, using oil for fuel. They report that they are constantly improving and extending their line of goods, making aluminum novelties of all descriptions and a line of spoons, trays, plates, dippers, wash basins and other household specialties.

The E. H. Mumford Company, builders of foundry molding machinery, Philadelphia, Pa., have bought for the United States the patent rights, molding machines and equipment of Ph. Bonvillain & E. Ronceray, Paris, France. The Mumford Company have added these French lines of molding machines to their own. The office of the Mumford Company will be moved from 17th and Callowhill streets, their present location, to 1315 Race street, Philadelphia, where the French machines have been on exhibition for some time. The machines have been illustrated and described in THE METAL INDUSTRY several times and the change mentioned in the American selling rights was outlined in our December number.

The Wetherill Finished Castings Company, Erie avenue, east of Richmond street, Philadelphia, Pa., who took over the business of the Pneumatic Casting Company, report that they are bringing out some remarkable work, using their standard aluminum alloy. They are having satisfactory results with such parts as gears, steering wheels, timer cases, electric brush holders, etc. Another kind of work in which they are successful is the die casting of Parson's White Brass, the bearing metal made by the Cramps Ship Yards, of Philadelphia. The Wetherill people report that they are making bearings cast accurate within a guaranteed maximum limit of .002 inch of the drawing specifications, whole or half round, complete with oil grooves, lugs, etc. They claim that their process without altering the coefficient of friction increases the density by nearly 10 per cent. and the rigidity under compression by 66⅔ per cent.

FIRES

On December 11 the Kokomo Brass Works, of Kokomo, Ind., suffered an $8,000 fire loss, which was almost fully covered by insurance. No serious delay in the business will result from the fire.

FINANCIAL

The Smith & Griggs Manufacturing Company, of Waterbury, Conn., makers of stamped novelties and brass goods, have increased their capital stock from $40,000 to $400,000. The concern has been doing a large business on a small capital.

Last year the Indian Aluminum Company, Ltd., of Madras, according to a statement just received, turned over $128,000 as compared with $13,000 for the year 1900. The total sales for the eight years of the company's working is $460,000. The company is to be congratulated upon this showing, particularly when we recall that the new metal has to be introduced to some of the most conservative and suspicious races in the world.

The National Copper Company, smelters, of 101 Beekman street, New York, and a refinery at Bayway, Elizabeth, N. J., and H. Heppenheimer & Sons, Inc., metal dealers, of 101 Beekman street, with a smelting works and warehouse at 419 Marcy avenue, Brooklyn, N. Y., are in financial difficulties and have made an assignment in Brooklyn to Herman Herst, Jr., and application has been made for a receiver. The two concerns are closely connected, Henry Heppenheimer, Leo Heppenheimer and Max Heppenheimer being respectively president, treasurer and secretary of each corporation. They have been doing a large and profitable business for the past year and a half, but the drop in the price of copper affected their business. Mr. Herst, Jr., reports that the combined liabilities of both companies would aggregate $200,000.

INCORPORATIONS

The Artistic Bronze Company, of Norwalk, Conn., has filed a certificate of organization in the office of the secretary of state.

The G. H. Atkinson Company of 15 Exchange place, Jersey City, N. J., has been incorporated with a capital of $100,000, to deal in sheet iron, copper, cornices, skylights, etc. The incorporators are G. H. Atkinson, R. L. Atkinson and W. S. Risley.

J. A. & S. W. Granbery, 525 Main street, East Orange, N. J., have been incorporated with a capital of $150,000, as manufacturing jewelers. The incorporators are John A. and Samuel W. Granbery and Patrick J. Coffey, all of East Orange.

The Usona Stamping Works, 199 Grand street, New York City, has been incorporated with a capital of $51,000 to manufacture metal stamps, dies, seal presses, etc. The directors are James A. Watt, Alexander W. Watt and Leon Sussman, all of the above address.

The Iron & Wire Works of Brooklyn, of Brooklyn, N. Y., has been incorporated with a capital of $30,000 to manufacture iron, bronze, brass and grill work, etc. The incorporators are P. Maurer, of Flatbush, N. Y.; V. Schmith, E. A. Dubey, B. Diamond and G. Maurer, all of Brooklyn.

The Dominion Metal & Manufacturing Company, of Madison, N. J., have been incorporated with a capital of $150,000 to manufacture metals, alloys, babbitt metals and bearings for locomotives, railways, etc. The directors are Charles E. W. Smith and S. M. Smith, both of Madison, and Frank C. Burton, 115 Broadway, New York City.

The Norwalk Artistic Bronze Company, of Norwalk, Conn., has filed articles of incorporation with the secretary of State, the object of the company being to manufacture and deal in bronze fixtures. The capital is $20,000. The incorporators are: William A. Babson and Gordon Grand, of South Orange, N. J., and Paulo Syabo, of Brooklyn, N. Y.

T R. McMann Company, of New York City, has been incorporated with a capital of $200,000 for the manufacture of pipe, fittings and plumbers' supplies, etc. The incorporators are Charles A. McMann, 301 West 106th street, and Chris. G. Hupfel, 436 West 23rd street, both New York City.

The Thomas W. Pangborn Company, 90 West street, New York City, for many years operating on a copartnership plan as manufacturers, dealers and agents in equipment and supplies for foundries, has been incorporated with a capital of $60,000, $55,000 of which has already been paid in. The officers of the company are Thomas W. Pangborn, president and treasurer; Edward R. Cooledge, vice-president; John C. Pangborn, secretary.

PRINTED MATTER

Hot Air Protector. We have received a small card from the S. Obermayer Company, of Cincinnati, O., which is partly cut out so as to fit over the ear, the flap covering the ear and conveying the information "hot air protector."

Calendar.—A very pretty calendar has been issued by the New York Brick & Paving Company, of Syracuse, N .Y., manufacturers of acid proof brick. The calendar contains a lithograph from a famous painting and is otherwise nicely designed.

Molding Machine. We have received from John A. Rathbone, 44 Buhl Block, Detroit, Mich., a circular showing by means of half-tones, samples of iron, brass, malleable and steel castings made on his multiple molding machines.

Silver Ware. The last issue of the little magazine sent out by the R. Wallace & Sons Manufacturing Company, of Wallingford, Conn., shows the latest examples of their plated pap bowls and plates, sterling bon bon and almond dishes, and their floral 26-piece set.

Aluminum Goods. We have received from the Aluminum Manufacturing Company, of Two Rivers, Wis., a catalogue and price list of their wide and varied lines of aluminum goods, such as combs, hairpins, household goods, advertising novelties, bicycle guards, fancy goods, etc.

Trucks is the title of a pamphlet prepared by the Fairbanks Company, of Broome and Lafayette streets, New York City. These trucks are made for every conceivable purpose, and the patterns and shapes are provided to suit all conditions of store, warehouse and manufacturing plant.

Hack Saws. The L. S. Starrett Company, of Athol, Mass., have prepared a circular reprinting an article from a Vicksburg paper which mentions the sawing of bars intended for the jail with Starrett hack saws. The saws used were purchased from a local hardware dealer and were the regular stock.

Foundry Flasks. Interchangeable foundry flasks, made by the Brass Founders' Supply Company, of 20 Prospect street, Newark, N. J., are fully described in a recent pamphlet. These flasks have an established reputation among manufacturers and the general satisfaction from their use makes them a large factor in the finished product of those plants.

Soldering Coppers. The Taunton-Bew Bedford Copper Company, of New Bedford, Mass., have prepared an attractive circular and price list dealing with their soldering coppers, which are made in regular and special shapes. The circular also mentions yellow (muntz) metal sheathing, slating and boat nails, condenser and supporting plates, naval brass and bronze and pure copper in sheets, bolts, bars, nails, tacks, boiler flue ferrules, corrugated gaskets, etc.

Antimony and its relation to babbitt anti-friction and other metals is the title of a folder by C. W. Leavitt & Company, St. Paul Building, New York City. Formulas are given for britannia, pewter, babbitt, linotype and electrotype mixtures. The company also make aluminum-antimony alloys which are

stated to be hard, tenacious, elastic, malleable, and which take a high polish and resist atmospheric corrosion.

METAL MELTING AND REFINING FURNACES. The Hawley Down Draft Furnace Company, of Superior and Townsend streets, Chicago, Ill., have prepared in pamphlet form some of the testimonials showing what users of the Schwartz furnaces think of them for handling brass, copper, bronze, aluminum, iron, steel, etc. The testimonials come from firms located all over the country and show the great satisfaction these furnaces have given.

VOLTAMMETER, for testing ignition batteries, is described in a circular by the Hoyt Electrical Instruments Works, of Penacook, N. H. By the use of this combination volt and ammeter the cells can be tested at work, as the ammeter readings will show what amount of current is being used, and the voltmeter readings will, at the same time, show to what extent the voltage is holding up when the batteries are actually doing the work called upon them to do.

ACID BLAST ETCHING MACHINERY. A circular from the Gill Engraving Company, 140 Fifth avenue, New York City, explains the Levy process of etching by machinery. This machine etches by the sharp impact of hundreds of minute sprays of acid on the plate at right angles to the surface. The results obtained are stated to be much superior to the old methods of etching. Used in connection with the etching machine is a powdering machine which automatically does what has heretofore been done by hand.

CALENDAR. I. Shonberg, of 363 Hudson avenue, Brooklyn, N. Y., has issued a large calendar, 21 inches wide by 22 high, with heavy block figures nearly 2 inches high, so they can be seen across a shop or office. The several sheets call attention to the firm's products in type metals, pewters, solders, bearing metals, metal restorer, etc. The January sheet mentions their metal rolling mill and carries the statement that "No order too small to receive our careful attention or too large for our facilities.

AUTOMATIC DROP LIFTER PARTS. Pamphlet M, prepared by the Miner & Peck Manufacturing Company, of New Haven, Conn., contains complete directions for ordering parts of Peck's patent automatic drop lifter. The method followed is extremely simple and convenient. Each part of the lifter is pictured in an outline drawing and beneath each drawing is printed a legend such as "diameter of shaft hole, diameter of pin hole," etc., these dimensions to be filled in by the user requiring the part. This method has been necessary, as these lifters have been changed in design and capacity several times. All of these parts are kept in stock so that parts wanted can be shipped on receipt of order.

CATALOGUE BUREAU

THE METAL INDUSTRY has established a Catalogue Bureau by which it will prepare and do all the work necessary for the making of catalogues, pamphlets, circulars and other printed matter. Estimates will be furnished for writing the description, making engravings, printing, binding, in fact for the entire job from the beginning to the end or any part of it. Let us know your needs and we will tell you just exactly what we can do and what it will cost you. A catalogue should be a trade getter—that is the kind we produce. Write to the CATALOGUE BUREAU of THE METAL INDUSTRY, 61 Beekman street, New York.

METAL MARKET REVIEW

NEW YORK, January 13, 1908.

COPPER.—The year 1907 can be classed as a year of extremes with reference to the production, consumption and prices of all metals. We started the year with an unprecedented business activity; mills and foundries all over the country were full of orders for months ahead. The only trouble apparent at that time was the scarcity of the raw metals—iron, steel, copper, lead, spelter, etc. We had been turning out pig iron at the rate of 25,000,000 tons a year, and this rate was increased to 27,000,000 tons in the month of October. Since then the production of pig iron was cut to less than half, or at the rate of 12,000,000 tons, in December of 1907. The pig iron market has always stood as the barometer of the prosperity of the country, but the copper market can just as surely be taken as the barometer, and as a barometer of the prosperity of the world copper ranks way ahead of pig iron on account of the heavy export demand for our copper. In the year under review we would point out that copper was more sensitive to the changing conditions and felt the effects of the collapse in business several weeks before the iron market. The price of copper began to weaken before any decline in iron, but the two metals are so closely connected with the general prosperity of the country that either can be taken as a standard. The production of pig iron was more than cut in half during the last three or four months of the year and the production of copper was cut about 30 per cent. in the same time. The copper market was strong, active and advanced from 24-25 cents in January, 1907, to 26-26½ in March (the high point in the year). Copper in London touched £110 15s. At this time and with the break in the stock market the London price of copper broke rapidly and immediately prices here began to decline and buyers, after clamoring for copper up to March, began to hold off. Producers or the large selling agents at this time made a fatal mistake of trying to hold the market at around 25 cents for Lake, 24¾ for electrolytic. Stocks began to accumulate and consumers were able to buy what little they wanted at ½ cent to a cent and more below the prices asked by the larger sellers. Prices steadily declined and the leading sellers began to gradually reduce their prices, but the procession had passed and they were unable to make any sales. This decline in prices and absence of buyers continued steadily from the end of March until about the middle of October, when the lowest prices of the year were reached. Lake was done at 12 cents and sales of Electrolytic were made as low as 11⅝ and possibly a shade lower, but at around these figures the foreign market had been taking hold and large sales were made during the last three months of the year to Europe and home consumers began to come in. The larger consumers, however, stayed out of the market owing probably to the money stringency and also to the apparent weakness of the copper market and the heavy accumulations of copper, reported at this time—the end of October—to be possibly 250,000,000 pounds. From October to December the copper market fluctuated between 13 and 14 cents for Lake, closing at the end of the year firmer and in a stronger position than for many months. The strong position of copper to-day is due to the heavy exports and the decreased production and the heavy accumulations have been so far worked off or exported that they are no longer a burden and producers are in shape now to wait for the demand that is certain to come along. This country is not going to stop consuming copper neither is the rest of the world. We have gone through an awful panic and it made us all pretty sick, but we are getting over it with our usual nerve and our "oh, forget it" qualities, and we are going ahead again, slowly perhaps, but we can't stay slow very long; it is not in us. The prosperity of this country is not made in Wall Street and the gamblers and speculators there have no more to do with the prosperity of our country than the fly on the wall or the boys who play craps in the street. The point to note in the copper situation at the moment is the heavy exports of the last three months amounting to over 224,000,000 pounds, while the total exports the whole of 1906 were 205,460 tons. These exports will just about clear off the accumulations and the present production can easily be taken care of. At the same time consumers are all bare of stock and when the demand does start it is more than probable that prices will easily reach 15 cents per pound. The production for the year 1906, according to Government returns, was 917,805,682 pounds and it has taken it about a year to find this out. The estimate of the Government given out earlier was 906,591,947

pounds. The production for 1907 is variously estimated at from 700,000,000 to 800,000,000 pounds and the consumption at 500,000,000 to 600,000,000 pounds. The imports for the year were 121,000 tons against 104,650 tons in 1906. The total exports for 1907 were 228,836 tons. The market closes firm; Lake at 14 cents, Electrolytic 13¾ to 13⅞ and casting brands at 13.25.

TIN.—The London tin market has suffered from the general shrinkage in business. Spot tin in London opened at £191 15s., ran up to £200, broke to £115 and closed at £123 10s, showing a net decline for the year of £61 per ton. The speculators in that active centre seem to have averaged up fairly well and no trouble has been reported. The foreign market to-day is more or less unsettled owing to considerable manipulation at the Straits owing to a heavy "bull" account by Chinese operators; stocks of tin have been held back and production has been curtailed. This account has been partly liquidated probably at a heavy loss, but there still remains a matter of 3,000 tons or more to be taken care of and this will probably have to be arranged before the Chinese new year at the end of February. The settlement of this account may change the tone of the foreign market.

The tin market in New York has been more or less controlled from London and prices have followed very closely the fluctuations of that speculative market. Straits tin in New York opened at 42 cents, advanced to 44 cents, the highest during the year, declined to 26 cents and closed at around 27 cents, showing a net decline for the year of 15 cents per pound. The statistics for the year are not very interesting. The total arrivals during 1907 were 33,972 tons and the total deliveries were 35,000 tons. The total deliveries for 1906 were 41,200 tons, showing that our consumption for 1907 decreased about 6,000 tons. This decrease in deliveries was about made up by increased deliveries in Europe, so that statistics are about normal and do not point in any way to any decreased output, but rather to a heavier supply for 1908. The market at the moment is dull and flat; consumers are inclined to hold off and await developments in the East. Spot tin, 5 and 10-ton lots, around 27 cents. Futures are offered 15 to 25 points lower, although future tin in London is quoted about £1 per ton above the price of spots.

LEAD.—The London market price for lead has declined about £6 per ton, opening at around £20 and closing at £14.

The New York market price for lead a year ago was around 6 cents per pound, the price the trust was asking. This price did not hold very long, as independent sellers were able to cut the trust price and took considerable business. The price stayed around 6 cents till March, when demand began to fall off and prices gradually declined to a shade below 3.50 cents in December. The trust had meanwhile withdrawn its fixed price and decided to sell "at the market," but it must be noted the trust did not meet the lowest prices and when the market was weak at around 3½ the trust held for 3.65 or better. The market is not in very good shape and it is reported there are heavy accumulations of metal awaiting a market. We imported during 1907 72,064 tons of foreign lead against 75,141 tons in 1906 and we exported 46,996 tons of foreign lead against 41,615 tons in 1906. The United States production of lead in 1906 was 312,637 long tons and the production of lead for 1907 is estimated at 300,000 tons.

The price of lead in New York at the end of 1907 showed a net decline for the year of 1¼ cents per pound. The market to-day is dull and unsettled at around 3.65 to 3.70, New York.

SPELTER.—The foreign spelter market has jogged along during the year 1907 and has not been troubled by panics or any other kind of hysteria. Opening at £21, the market held fairly steady throughout and gradually declined to £19.10 at the close, showing a net decline for the year of only £1 10s. per ton.

The New York market was affected by the general slump and prices show a net decline for the year of about 2¼ cents per pound. Prices in New York ran up to 7.15 in March and dropped to 4¼ in December. The market at the moment is in fair shape, but there is still a heavy stock of ore and metal in the West awaiting a market. The production of spelter for 1906 was 178,298 long tons against 182,008 tons in 1905. The production for 1907 is estimated at 160,000 tons. The market price in New York is around 4.40 to 4.45, carload lots.

ANTIMONY.—The foreign antimony market began to break around March and prices declined rapidly from around £112 for Halletts to £34 at the close, a decline of nearly £80 per ton on an article that is probably worth about £30. The foreign makers had apparently got together and rigged the market and supplies and made a good thing out of it.

The New York market followed the decline abroad and at most times was below the cost of importation. Prices dropped from around 24.75 for Cooksons a year ago to close to 9 cents to-day and Halletts from 23½ cents to close to 8¾ to-day. The market to-day is in better shape and consumers are bare of supplies and all the old stocks are worked off.

ALUMINUM.—The market for this metal has got down to a normal basis, the let up in demand has brought lower prices and makers are now in shape for a very much increased output whenever the market is ready for it. The price to-day is from 33 to 35 cents against 41 cents a year ago. Sheets, wire and tubing have been reduced according to the above basis for the metal.

SILVER.—The price of silver shows a heavy, steady decline for the year. London opened at 32 7-16d. per ounce and declined, with very slight fluctuations, to 2⁄ 7-16d., the lowest point of the year, at the close.

In the New York market it is the same story; opened at 70⅛ cents per ounce, the highest for the year, and closed at 52⅛ cents, the low point of the year. The United States production of silver for 1906 was 56,517,900 ounces against 56,101,594 ounces in 1905. The production for 1907 is estimated at 56,000,000 ounces.

SHEET METALS.—The demand for sheet copper and brass tubing, etc., has followed the fashion of other lines and prices have been cut in sympathy with the decline in ingot copper. A year ago the price of sheet copper was 30 cents base, with ingot at around 25 cents. To-day the price is 20 cents base, made on the 26th of September last and based on ingot copper at 15 cents per pound. Copper wire stands 16½ cents base. Seamless brass tubing at 20 cents base.

OLD METALS.—The year 1906 was indeed a red letter year for the old metal trade, as we wrote in our report of a year ago, but the color changed to blue, and a very deep blue, in the first quarter of 1907. With 1907 closed the outlook is certainly brighter and there is a general feeling in the trade that the worst is over. Rock bottom has been touched and a steady improvement in prices and business is confidently looked for. Scrap copper to-day is worth about 11.50 to 12 cents per pound against 21-22 cents a year ago and the declines have been steady with hardly any fluctuation during the last nine months of the year; 1908 opens auspiciously and we wish the whole metal trade of the country every success for the coming twelve months and more.

THE DECEMBER MOVEMENT IN METALS.

	Highest.	Lowest.	Average.
COPPER—			
Lake	14.00	13.00	13.50
Electrolytic	13.75	13.00	13.25
Casting	13.25	12.25	12.75
TIN	30.25	26.00	28.20
LEAD	4.20	3.50	3.80
SPELTER	4.95	4.30	4.50
ANTIMONY (Halletts)	9.25	8.50	8.75

DAILY METAL PRICES

We have made arrangements with the New York Metal Exchange by which we can furnish our readers with the Official Daily Metal Market Reports of the Exchange and a year's subscription to THE METAL INDUSTRY for the sum of $10. The price of the Report alone is $10. Sample copies furnished for the asking. We can also furnish daily telegraphic reports of metal prices.

See Advertising Page 27 Following for Trade Wants

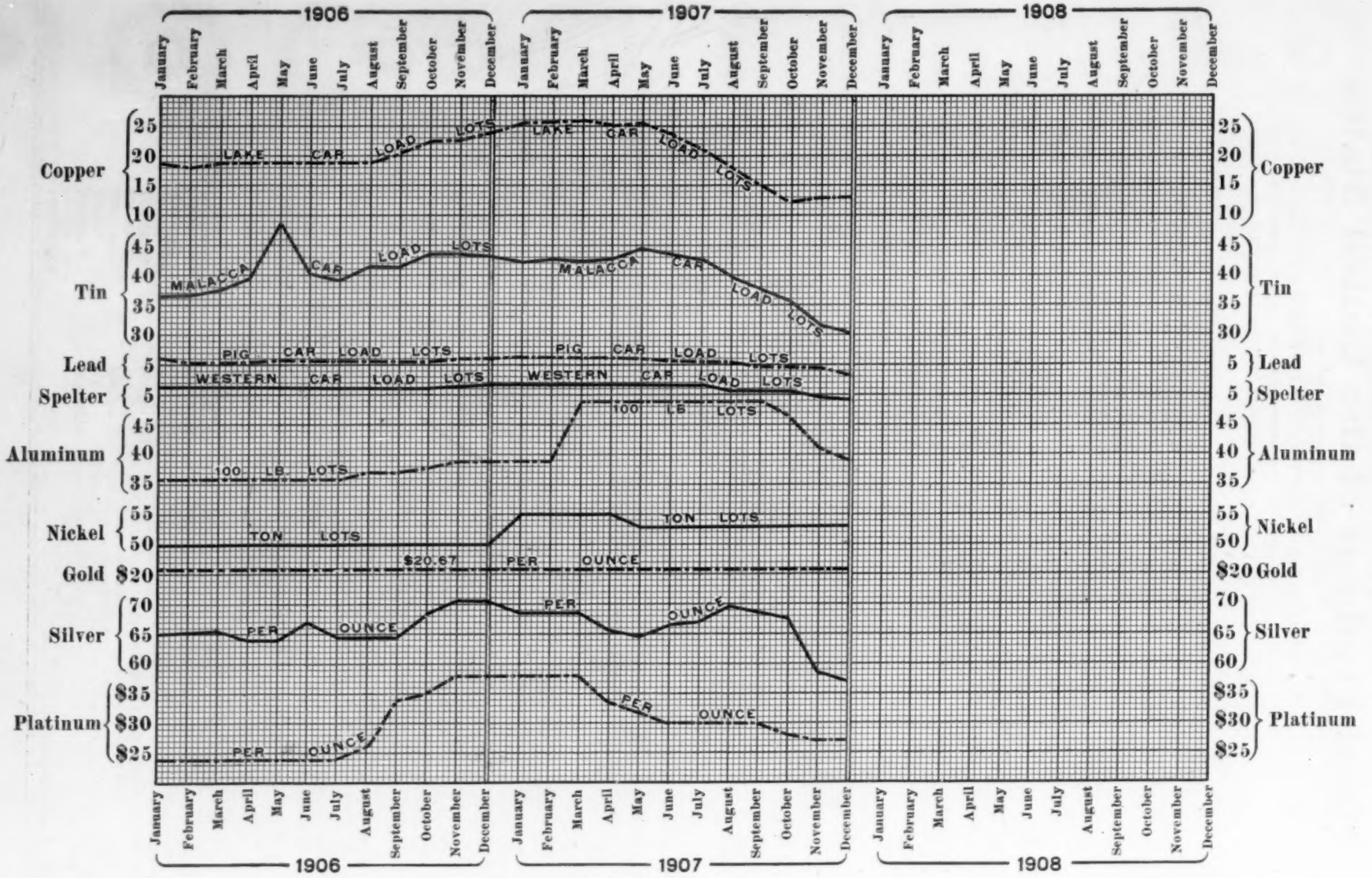


CHART OF METAL PRICES

Metal Products of the United States

Calendar Years 1898 to 1907.

(FROM THE UNITED STATES GEOLOGICAL SURVEY.)

PRODUCTS. METALLIC.	1898. Quantity.	1898. Value.	1899. Quantity.	1899. Value.	1900. Quantity.	1900. Value.	Products.
Pig iron (spot value) long tons	11,773,934	$116,557,000	13,620,703	$245,172,654	13,789,242	$259,944,000	Pig iron.
Silver, commercial value, troy ounces	54,438,000	32,118,400	54,764,500	32,858,700	57,647,000	35,741,100	Silver.
Gold, coining value, troy ounces	3,118,398	64,463,000	3,437,210	71,053,400	3,829,897	79,171,000	Gold
Copper, value at New York City, pounds	526,512,987	61,865,276	568,666,921	101,222,712	606,117,166	98,494,039	Copper.
Lead, value at New York City, short tons	222,000	16,650,000	210,500	18,945,000	270,824	23,561,688	Lead.
Zinc, value at New York City, short tons	115,399	10,385,910	129,051	14,840,865	123,886	10,654,196	Zinc.
Quicksilver, value at San Francisco, flasks	31,092	1,188,627	30,454	1,452,745	28,317	1,302,586	Quicksilver.
Aluminum, value at Pittsburg, pounds	5,200,000	1,716,000	6,500,000	1,716,000	7,150,000	1,920,000	Aluminum.
Antimony, value at S. F'cisco, short tons	3,238	532,101	2,861	559,189	4,226	837,896	Antimony.
Nickel, value at Philadelphia, pounds	11,145	3,956	22,541	8,566	9,715	3,886	Nickel.
Tin, pounds	(*none.*)	.....	(*none.*)	.....	(*none.*)	.....	Tin.
Platinum, value (crude) at New York City, troy ounces	225	1,913	300	1,800	400	2,500	Platinum.
Total value of metallic products	.....	$305,482,183	.....	$487,831,631	.....	$511,632,891	

PRODUCTS. METALLIC.	1901. Quantity.	1901. Value.	1902. Quantity.	1902. Value.	1903. Quantity.	1903. Value.	Products.
Pig iron (spot value) long tons	15,878,354	$242,174,000	17,821,307	$372,775,000	18,009,252	$344,350,000	Pig iron.
Silver, commercial value, troy ounces	55,214,000	33,128,400	55,500,000	29,415,000	54,300,000	29,322,000	Silver.
Gold, coining value, troy ounces	3,805,500	78,666,700	3,870,000	80,000,000	3,560,000	73,591,700	Gold.
Copper, value at New York City, pounds	602,072,519	87,300,515	659,508,644	76,568,954	698,044,517	91,506,006	Copper.
Lead, value at New York City, short tons	270,700	23,280,200	270,000	22,140,000	282,000	23,520,000	Lead.
Zinc, value at New York City, short tons	140,822	11,265,760	156,927	14,625,596	159,219	16,717,995	Zinc.
Quicksilver, value at San Francisco, flasks	29,727	1,382,305	34,291	1,467,848	35,620	1,544,934	Quicksilver.
Aluminum, value at Pittsburg, pounds	7,150,000	2,238,000	7,300,000	2,284,590	7,500,000	2,284,900	Aluminum.
Antimony, value at S. F'cisco, short tons	2,639	539,902	3,561	634,506	3,128	548,433	Antimony.
Nickel, value at Philadelphia, pounds	6,700	3,551	5,748	2,701	114,200	45,900	Nickel.
Tin, pounds	(*none.*)	.....	(*none.*)	.....	(*none.*)	.....	Tin.
Platinum, value (crude) at New York City, troy ounces	1,408	27,526	94	1,814	110	2,080	Platinum.
Total value of metallic products	.....	$480,006,859	.....	$599,916,009	.....	$583,433,948	

PRODUCTS. METALLIC.	1904. Quantity.	1904. Value.	1905. Quantity.	1905. Value.	1906. Quantity.	1906. Value.	Products.
Pig iron (spot value) long tons	16,497,033	$233,025,000	22,992,380	$382,450,000	25,307,191	$505,700,000	Pig iron.
Silver, commercial value, troy ounces	55,999,864	32,035,378	56,101,600	34,221,976	56,517,900	38,256,400	Silver.
Gold, coining value, troy ounces	3,910,729	80,835,648	4,265,742	88,180,700	4,565,333	94,373,800	Gold.
Copper, value at New York City, pounds	812,537,267	105,629,845	901,907,843	139,795,716	917,805,682	177,595,888	Copper.
Lead, value at New York City, short tons	307,000	26,402,000	302,000	28,690,000	350,153	39,917,442	Lead.
Zinc, value at New York City, short tons	186,702	18,670,200	203,849	24,054,182	199,694	24,362,668	Zinc.
Quicksilver, value at San Francisco, flasks	34,570	1,503,795	30,451	1,103,120	26,238	958,634	Quicksilver.
Aluminum, value at Pittsburg, pounds	8,600,000	2,477,000	11,347,000	3,246,300	14,910,000	4,262,286	Aluminum.
Antimony, value at S. F'cisco, short tons	3,057	505,524	3,240	705,787	1,766	602,949	Antimony.
Nickel, value at Philadelphia, pounds	24,000	11,400	.....	.....	.....	.....	Nickel.
Tin, pounds	.....	.....	.....	.....	.....	35,600	Tin.
Platinum, value (crude) at New York City, troy ounces	200	4,160	318	5,320	1,439	45,189	Platinum.
Total value of metallic products	.....	$501,099,950	.....	$702,453,101	.....	$886,110,856	

FROM THE *ENGINEERING AND MINING JOURNAL* (ESTIMATED).

PRODUCTS. METALLIC.	1907. Quantity.	Value. Total.	Per Unit.
Pig iron, long tons	25,975,944	$592,251,523	22.80
Silver, fine ounces	56,925,911	37,187,990	0.65327
Gold, fine ounces	4,335,560	89,616,017	20.67
Copper, pounds	895,104,000	184,937,437	0.20661
Lead, short tons	359,058	38,239,677	106.50
Zinc, short tons	246,688	29,415,077	119.24
Quicksilver, flasks	19,900	805,950	40.50
Aluminum, pounds	25,000,000	11,250,000	0.45
Total value of metallic products		$963,703,671	

Metal Prices, January 17, 1908

NEW METALS.

	Price per lb.
COPPER, PIG, BAR AND INGOT AND OLD COPPER. Duty Free. Manufactured 2½c. per lb.	
Lake, car load lots	14.00
Electrolytic, car load lots	13.75
Casting, car load lots	13.25
TIN—Duty Free.	
Straits of Malacca, car load lots	27.75
LEAD—Duty Pigs, Bars and Old 2½c. per lb., pipe and sheets 2½c. per lb.	
Pig lead, car load lots	3.80
SPELTER—Duty 1½c. per lb.	
Western, car load lots	4.40
ALUMINUM—Duty Crude, 8c. per lb. Plates, sheets, bars and rods 13c. per lb.	
Small lots	35.00
100 lb. lots	34.00
Ton lots	33.00
ANTIMONY—Duty ¾c. per lb.	
Cookson's, cask lots, nominal	9.25
Halletts, cask lots	8.75
Other, cask lots	8.50
NICKEL—Duty 6c. per lb.	
Shot, Plaquettes, Ingots, Blocks, according to quantity	.45 to .60
MANGANESE—Duty 20%	.80
MAGNESIUM—Duty Free	$1.40
BISMUTH—Duty Free	1.80
CADMIUM—Duty Free	1.55 to 1.60
	Price per oz.
GOLD—Duty Free	$20.67
SILVER—Duty Free	.55⅝
PLATINUM—Duty Free	27.00
QUICKSILVER—Duty 7c. per lb. Price per pound	.63c. to 64c.

OLD METALS.

	Price per lb.	
Heavy Cut Copper	11.50	12.00
Copper Wire	11.00	11.50
Light Copper	9.75	10.25
Heavy Mach. Comp.	10.50	11.00
Heavy Brass	8.00	9.00
Light Brass	6.00	7.00
No. 1 Yellow Brass Turnings	7.00	7.50
No. 1 Comp. Turnings	9.00	9.50
Heavy Lead	3.00	3.25
Zinc Scrap	3.00	3.50
Scrap Aluminum, sheet, pure	19.00	20.00
Scrap Aluminum, cast, alloyed	18.00	19.00
Scrap Aluminum, turnings	8.00	8.50
Old Nickel, solid	22.00	26.00
No. 1 Pewter	18.00	19.00

INGOT METALS.

			Price per lb.
Silicon Copper	according to quantity		33 to 38
Phosphor Copper, 5%	"	"	19 to 21
Phosphor Copper, 10% to 15% Guaranteed	"	"	28 to 30
Phosphor Tin	"	"	34 to 36
Brass Ingot, Yellow	"	"	10 to 12
Brass Ingot, Red	"	"	12 to 14
Bronze Ingot	"	"	12 to 14
Manganese Bronze	"	"	17 to 19
Phosphor Bronze	"	"	16 to 19

ZINC—Duty, sheet, 2c. per lb.	Price per lb.
600 lb. casks	7.50
Open casks	8.00

PHOSPHORUS—Duty 18c. per lb.	
According to quantity	32 to 42

PRICES OF HOT ROLLED SHEET COPPER.

SIZES OF SHEETS.		64 oz. and over 50 lb. sheet 30 x 60 and heavier.	32 oz. to 64 oz. 25 to 50 lbs. sheet 30 x 60.	20 oz. to 32 oz. 15¾ to 25 lb. sheet 30 x 60.	16 oz. to 24 oz. 12½ to 18¾ lb. sheet 30 x 60.	14 oz. and 15 oz. 11 to 12½ lb. sheet 30 x 60.	12 oz. and 13 oz. 9½ to 11 lb. sheet 30 x 60.	10 oz. and 11 oz. 7¾ to 9½ lb. sheet 30 x 60.	8 oz. and 9 oz. 6¼ to 7¾ lb. sheet 30 x 60.	Lighter than 8 oz.
		CENTS PER POUND.								
Not wider than 30 ins.	Not longer than 72 inches.	20	20	20	20	21	22	23	26	29
	Longer than 72 inches. Not longer than 96 inches.	20	20	20	20	21	23	26	29	
	Longer than 96 inches.	20	20	20	20	22	26			
Wider than 30 ins. but not wider than 36 inches.	Not longer than 72 inches.	20	20	20	20	22	24	27	30	
	Longer than 72 inches. Not longer than 96 inches.	20	20	20	20	22	26	29		
	Longer than 96 inches. Not longer than 120 inches.	20	20	20	21	23				
	Longer than 120 inches.	20	20	21	22					
Wider than 36 ins. but not wider than 48 inches.	Not longer than 72 inches.	20	20	21	22	24	27			
	Longer than 72 inches. Not longer than 96 inches.	20	20	21	23	25	28			
	Longer than 96 inches. Not longer than 120 inches.	20	20	22	24	28				
	Longer than 120 inches.	20	21	23	26					
Wider than 48 ins. but not wider than 60 inches.	Not longer than 72 inches.	20	20	21	23	26	30			
	Longer than 72 inches. Not longer than 96 inches.	20	20	22	24	29				
	Longer than 96 inches. Not longer than 120 inches.	20	21	23	26					
	Longer than 120 inches.	21	22	24	28					
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 inches.	20	21	23	28					
	Longer than 96 inches. Not longer than 120 inches.	20	22	25	30					
	Longer than 120 inches.	21	23	28						
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 inches.	21	23	26						
	Longer than 96 inches. Not longer than 120 inches.	22	24	27						
	Longer than 120 inches.	23	25	29						
Wider than 108 ins.	Not longer than 132 inches.	24	26							
	Longer than 132 inches	25	28							

Rolled Round Copper, ⅜ inch diameter or over, 20 cents per pound. (Cold Drawn, Square and Special Shapes, extra.)

Circles, Segments and Pattern Sheets three (3) cents per pound advance over prices of Sheet Copper required to cut them from.

All Cold or Hard Rolled Copper, 14 ounces per square foot and heavier, one (1) cent per pound over the foregoing prices.

All Cold or Hard Rolled Copper, lighter than 14 ounces per square foot, two (2) cents per pound over the foregoing prices.

Cold Rolled and Annealed Copper, Sheets and Circles, take the same price as Cold or Hard Rolled Copper of corresponding dimensions and thickness.

All Polished Copper, 20 inches wide and under, one (1) cent per pound advance over the price for Cold Rolled Copper.

All Polished Copper, over 20 inches wide, two (2) cents per pound advance over the price for Cold Rolled Copper.

Planished Copper, one (1) cent per pound more than Polished Copper.

Cold Rolled Copper prepared suitable for polishing, same prices and extras as Polished Copper.

Tinning Sheets, on one side, 3½c. per square foot.

For tinning both sides, double the above price.

For tinning the edge of sheets, one or both sides, price shall be the same as for tinning all of one side of the specified sheet.

Net Cash Prices.

COPPER BOTTOMS, PITS AND FLATS.

14 oz. to square foot and heavier, per lb.	24c.
12 oz. and up to 14 oz. to square foot, per lb.	25c.
10 oz. and up to 12 oz.	27c.
Lighter than 10 oz.	30c.

Circles less than 8 in. dia., 2c. per lb. additional.

Circles over 13 in. dia. are classed as Copper Bottoms.

Polished Copper Bottoms and Flats, 1c. per lb. extra.

Metal Prices, January 17, 1908

PRICES ON BRASS MATERIAL—MILL SHIPMENTS.

In effect January 2nd, 1908, and until further notice.

To customers who purchase less than 5,000 lbs. per month and over 5,000 lbs. per year.

	Net base per lb.		
	High Brass.	Low Brass.	Bronze.
Sheet	$0.14¼	$0.16⅝	$0.18⅛
Wire ¼" and larger	.14½	.16⅝	.18⅝
Wire smaller than ¼" to No. 8, inclusive	.15¼	.17⅝	.19⅛
Wire smaller than No. 8 to No. 10, inc'sive	.15⅝	.17⅞	.19⅝
Rods ¼" and larger to ½" diameter	.14⅝	.16⅞	.19⅝
Rods ¼" to 1" diameter, both inclusive	.14½	.16⅝	.19⅝
Brazed tubing	.20⅝	—	.23½
Open seam tubing	.18⅝	—	.21⅛
Angle and channel	.20¾	—	.24⅝

30% discount from all extras except for quality.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring, drawing and spinning brass	1¼c. per lb. net advance.
" —Best spring, drawing and spinning brass	2¼c. " " " "
" —Rich low brass	⅜c. " " " "
Wire—Extra spring and brazing brass wire	1¼c. " " " "
" —Best spring and brazing brass wire	2¼c. " " " "
" —Rich low brass wire	¾c. " " " "

To customers who purchase less than 5,000 lbs. per year.

	Net base per lb.		
	High Brass.	Low Brass.	Bronze.
Sheet	$0.15¼	$0.17⅝	$0.19⅛
Wire ¼" and larger	.15½	.17⅝	.19⅝
Wire smaller than ¼" to No. 8, inclusive	.16¼	.18⅝	.20⅛
Wire smaller than No. 8 to No. 10, inc'sive	.16⅝	.18⅞	.20⅝
Rods ¼" and larger to ½" diameter	.15⅝	.17⅞	.20⅝
Rods ⅜" to 1" diameter, both inclusive	.15½	.17⅝	.20⅝
Brazed tubing	.21⅝	—	.24½
Open seam tubing	.19⅝	—	.22½
Angle and channel	.21¾	—	.25⅝

5% discount from all extras except for quality.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring, drawing and spinning brass	2¼c. per lb. net advance.
" —Best spring, drawing and spinning brass	3¼c. " " " "
" —Rich low brass	1⅜c. " " " "
Wire—Extra spring and brazing brass wire	2¼c. " " " "
" —Best spring and brazing brass wire	3¼c. " " " "
" —Rich low brass wire	1⅜c. " " " "

PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ to 3½ in. O. D. Nos. 4 to 13 Stubs' Gauge, 20c. per lb.
Seamless Copper Tubing, 23c. per lb.

For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron Pipe Size.	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price per lb.	28	27	22	21	20	20	20	20	20	20	20	21	22	24	26	27

PRICE LIST OF IRON LINED TUBING—NOT POLISHED.

	Per 100 feet.	
	Brass.	Bronze.
⅜ inch	$8	$9
½ inch	8	9
⅝ inch	10	11
¾ inch	12	13
⅞ inch	14	15
1 inch	18	20
1⅛ inch	22	24
1¼ inch	25	27
1½ inch	32	35
1¾ inch	45	48
2 inch	56	60

Discount 45 per cent.

PRICES FOR MUNTZ METAL AND TOBIN BRONZE.

Muntz or Yellow Metal Sheathing (14" x 48")	13c. lb. net base
" " " Rectangular Sheets other than Sheathing	17c. " " "
" " " Rod	16c. " " "
Tobin Bronze Rod	18c. " " "

Above are for 100 lbs. or more in one order.

PLATERS' METALS.

Platers' bars in the rough, 23½c. net.
German silver platers' bars dependent on the percentage of nickel, quantity and general character of the order.
Platers' bars, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturers.

PRICES FOR SHEET BLOCK TIN AND BRITANNIA METAL.

Not over 18 in. in width, not thinner than 23 B. S. Gauge, 4c. above price of pig tin in same quality.
Not over 35 in. in width, not thinner than 22 B. S. Gauge, 5c. above price of pig tin.

PRICE LIST FOR SHEET ALUMINUM—B. & S. Gauge.

Wider than..... and including....	3in. 12in.	6in. 14in.	14in. 16in.	16in. 18in.	18in. 20in.	20in. 24in.	24in. 30in.	30in. 36in.	36in. 40in.
	in coils.								
No. 13 and heavier	40	40	42	42	42	42	45	45	45
" 14	40	40	42	42	42	42	45	45	45
" 15	40	40	42	42	42	42	45	45	45
" 16	40	40	42	42	42	42	45	45	45
" 17	40	40	42	42	42	42	45	45	45
" 18	40	40	42	42	42	42	45	45	48
" 19	40	40	42	42	42	42	45	46	49
" 20	40	42	42	42	42	44	47	48	50
" 21	40	44	44	44	44	46	49	50	56
" 22	40	44	44	44	46	46	49	53	57
" 23	40	44	44	44	46	46	49	55	58
" 24	40	44	46	48	48	48	51	57	60
" 25	42	45	47	49	49	49	52	59	63
" 26	42	45	48	52	52	52	57	61	67
" 27	42	46	50	54	54	55	60	64	70
" 28	42	46	52	54	55	55	62	68	73
" 29	44	47	54	56	58	58	67	73	78
" 30	44	48	56	58	62	68	76	78	83
" 31	49	53	61	64	69	77	80	84	89
" 32	51	55	63	67	75	83	90	96	101
" 33	53	57	66	71	79	90	97	106	116
" 34	56	61	68	76	84	97	109	116	126
" 35	..	71	76	86	96	106	121	131	..
" 36	..	86	96	106	121	126	141	..	..
" 37	...	110	114	135	150	165	180	..	..
" 38	..	130	145	160	175	190	210	..	..
" 39	..	150	170	190	210	230	..	..	..
" 40	..	180	210	230	250	..	..	..	..

In flat rolled sheets the above prices refer to lengths between 2 and 8 feet. Prices furnished by the manufacturers for wider and narrower sheet. All columns except the first refer to flat rolled sheet. Prices are for 50 lbs. or more at one time. Less quantities 5c. lb. extra. Charges made for boxing.

PRICE LIST OF SEAMLESS ALUMINUM TUBING.

Stubs' G. B. & S. G.	1¼"	1½"	1¾"	2"	2¼"	2½"	2¾"	3"	3¼"	3½"	3¾"	4"	4¼"	4½"
4 to 11	3 to 9	BASE PRICE 50 CENTS.										3	3	3	10
12	10											6	6	6	13
13	11											10	10	10	16
14	12	3	3	3	3	3	3	3	3	3	3	13	13	13	19
15	13	3	3	3	3	3	3	3	3	3	3	19	19	19	22
16	14	6	6	6	6	6	6	6	6	6	16	19	22	25	35
17	15	10	10	10	10	10	10	10	10	16	19	22	25	29	38
18	16	13	13	13	13	13	13	19	22	25	29	32	35	44
19	17	16	16	16	16	16	22	25	29	32	35	41	48	54
20	18-19	19	19	19	19	19	22	22	25	29	35	35	41	60	60
21	20	22	22	22	22	22	..	..	..	..	..	..	..	..	..
22	21	25	25	25	25	25	..	..	..	..	..	..	..	..	..
23	22	35	35	35	41	48	..	..	..	..	..	..	..	..	..
24	23	57	60	60	63	67	..	..	..	..	..	..	..	..	..
25	24	73	76	..	..	..	..	..	..	..	..	..	..	..	..

Prices are for ten pounds or more at a time. For prices on smaller sizes send for manufacturers' list.

PRICE LIST FOR ALUMINUM ROD AND WIRE.

Diameter B. & S. G'ge.	000 to No. 10.	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price, per lb....	38	38½	38½	39	39½	40	40½	41	42	43	44	47	52

200 lbs. to 30,000 lbs., 3 cents off list; 30,000 lbs. and over, 4 cents off list.

PRICE LIST FOR GERMAN SILVER IN SHEETS AND ROLLS.

Per cent.	Price per lb.	Per cent.	Price per lb.
12	$0.52	16	$0.58
13	.53	17	.59
14	.54	18	.60
15	.55		

These prices are for sheets and rolls over 2 inches in width, to and including 8 inches in width and to No. 20, inclusive, American or Brown & Sharpe's Gauge. Prices are for 100 lbs. or more of one size and gauge in one order. Discount 45 per cent.

GERMAN SILVER TUBING.

4	per cent.	to No. 19, B. & S. Gauge, inclusive			$0.60
6	"	" 19,	"	"	.70
9	"	" 19,	"	"	.85
12	"	" 19,	"	"	1.00
15	"	" 19,	"	"	1.15
16	"	" 19,	"	"	1.20
18	"	" 19,	"	"	1.30

German Silver Tubing thinner than No. 19 B. & S. Gauge add same advances as for Brazed Brass Tube.
For cutting to special lengths add same advances as for Brazed Brass Tube. Discount 35 per cent.

PRICE OF SHEET SILVER.

Roller sterling silver .925 fine is sold according to gauge quantity and market conditions. No fixed quotations can be given as prices range from 2c. below to 6c. above the price of bullion.
Rolled silver anodes .999 fine are quoted at 2c. above the price of bullion.

TRADE WANTS

AN EXCHANGE FOR THE WANTS OF THE METAL TRADES.

Advertisements will be inserted under this head at 40 cents per line, 3 lines one dollar, for each insertion. Answers sent in our care will be forwarded.

METALS AND EQUIPMENT FOR SALE

FOR SALE.

Second Hand Heavy Geared Wire Bar Slitting Machine, Waterbury Farrel Foundry Machine Co.'s make, in first-class order. 2 sets arbors for slitting 3/8"x 1/2" and 1 1/8"x 3/8". Will sell cheap.

REED & BARTON, Taunton, Mass.

FOR SALE CHEAP—A MOUSSETTE NO. 2 STEEL CRUSHER, f. o. b. Newark, N. J.; in use four months. Address D. I. CANFIELD, 196 Newark street, Newark, N. J.

FOR SALE—ONE 275 STEELE-HARVEY FURNACE in perfect condition. Will sell cheap. For further particulars address Box 1, care THE METAL INDUSTRY.

FOR SALE—Small quantity of Steel Knife Blanks and Metal Fork and Spoon Blanks. Address, AYER MANUFACTURING COMPANY, Keokuk, Iowa.

FOR SALE—A World Plating Dynamo about 6 volts, 300 amperes, in good working condition. Has been run on 400 gallon brass solution, 200 gallon nickel and copper. Only fault too small for our increasing business. Address THE METAL MANUFACTURING CO., 106 Park St., New Haven, Conn.

FOR SALE—Patent on Automatic Computing Scale, on royalty basis. Address V. D. ADKINS, Ashland, Ky.

FOR SALE—5 to 10 tons prime remelted SPELTER; also 5,000 pounds TERNE METAL. Quotations upon application. Address P. McLAUGHLIN'S SONS COMPANY, 230-236 North Twelfth street, Brooklyn, N. Y.

FOR SALE—A lot of new SHEET BRASS and ALUMINUM at a bargain. WALSH'S SONS & CO., Newark, N. J.

FOR SALE—A 10 H. P. Nash Gas Engine, A1 condition. Price $150. Address ENGINE, care THE METAL INDUSTRY.

METALS AND EQUIPMENT WANTED

WANTED—Second-hand equipment for NICKEL-PLATING DEPARTMENT—Dynamo, Eight Tanks, Shafting, Polishing Machines, etc. Address BONNET-NANCE STOVE COMPANY, Chicago, Ill.

WANTED—Three Hundred Pounds of Second-hand NICKEL ANODES, 8 x 12. Address KRAEUTER & CO., Incorporated, Newark, N. J.

WANTED—In large and small quantities, ELECTROTYPE SHELLS, also SMALL TYPE. Address ALBERT A. MOERS, 24 and 26 Stone street, New York.

WANTED—To manufacture by a well equipped plant, some foundry machine or device. Can furnish capital, engineering experience and a first-class manufacturing plant. Address HAWLEY DOWN DRAFT FURNACE COMPANY, Chicago, Ill.

WANTED—A smelting plant located on the Atlantic seaboard. Address RELIANCE, care THE METAL INDUSTRY.

WANTED—A SECOND HAND small experimenting furnace to melt about 30 pounds of metal a day. Address EXPERIMENT, care THE METAL INDUSTRY.

WANTED—A SMALL BRASS FOUNDRY in the vicinity of NEW YORK. Will lease or buy. Address BRASS FOUNDRY, care THE METAL INDUSTRY.

WANTED—A NO. 2 SWARTZ FURNACE. Reply SCHWARTZ, care THE METAL INDUSTRY.

CASH PAID for old precious metals and minerals in any form. Gas mantle dust, bronze powder, bismuth, platinum, mercury, nickel, etc. Address JOSEF RADNAI, 36 Fulton street, New York City.

WANTED—METALS and WASTE of all kinds. Address WALSH'S SONS & CO., Newark, N. J.

SITUATIONS OPEN

WANTED—A BRASS MOLDER. Young single man who is willing to start for $3 per day. For further particulars address Box No. 3, care THE METAL INDUSTRY.

WANTED—MOLDER who understands brass and aluminum and alloys. Small new foundry, electric equipment, country town. Good opportunity for sober, industrious man who wants to advance. Address, Box 2, care THE METAL INDUSTRY.

SITUATIONS OPEN

WANTED—If you think you are or can learn to be a first class Lacquer salesman write LACQUER, care THE METAL INDUSTRY.

WANTED—FOREMAN for CHANDELIER and ELECTRIC LIGHT FIXTURE DEPARTMENT. Experienced man, capable of handling 30 to 40 men. State experience and salary. Address TORONTO, THE METAL INDUSTRY.

WANTED—A good office man with $4,000 capital to engage in a manufacturing business in Richmond, a suburb of San Francisco, Cal., to manufacture in a plant that is at present idle. Good opportunity. Address CALIFORNIA, care THE METAL INDUSTRY.

SITUATIONS WANTED

SITUATION WANTED—By a BRASS FOUNDER of twenty (20) years' experience. A good mixer and with a full knowledge of how to produce fine surface work; also general jobbing, with ability to take charge and show results. Can furnish best of references. Address Box 5, care THE METAL INDUSTRY.

SITUATION WANTED—By PLATER thoroughly conversant with Bronze, Brass, Copper and Nickel Plating, their oxidizes and finishes. Can furnish best of references. Address Box No. 6, care THE METAL INDUSTRY.

SITUATION WANTED—By BRASS FOUNDRY FOREMAN who thoroughly understands the business. Desire to take charge and work for an interest in same. Address Box 120, Lincoln Park, N. Y.

SITUATION WANTED—By PATTERN MAKER and MOLDER in Fancy Bronze and Sterling Silverware in shop. Knows up-to-date methods resulting in extreme economy of labor. Can demonstrate and give good references. Address Box No. 7, care THE METAL INDUSTRY.

SITUATION WANTED—By PLATER with 28 years' experience in all metals, including platinum. Should be glad to hear from firms desiring the services of a first class plater. Address Box No. 8, care THE METAL INDUSTRY.

SITUATION WANTED—By BRASS FOUNDRY FOREMAN of 25 years' experience. Thoroughly familiar with new and old metals and well posted on moulding heavy and light castings; also the handling of men. Can furnish best of references. For further particulars address Box No. 9, care THE METAL INDUSTRIES.

SITUATION WANTED—By a COPPERSMITH, having worked at this trade three years as apprentice and one year as master workman. High school education and familiar with all corts of copper, brass and bronze work—casting, die work, spinning, brazing, finishing, etc. For further particulars address Box No. 9, care THE METAL INDUSTRY.

SITUATION WANTED—By ELECTRO-PLATER with up-to-date methods, resulting in extreme economy as to labor and superior finish. Would like to take position about January first. Can demonstrate and give satisfactory reference. Address ELECTRO-PLATER, care THE METAL INDUSTRY.

SITUATION WANTED—By a FIRST-CLASS PLATER, to take charge of PLATING PLANT. Can furnish satisfactory reference of ability to take charge. Address WM. McCONNELL, 1665 58th street, Brooklyn, N. Y.

SITUATION WANTED—A position as Foreman of Plating and Polishing Rooms. Have had plenty of experience and can furnish best of references. Address J. J. C., care THE METAL INDUSTRY.

SITUATION WANTED—Position as Foundry Foreman or Superintendent in brass. Have had twenty years' experience and can give the best of references. Do my own mixing. Address F. B. M., care THE METAL INDUSTRY.

SITUATION WANTED—Superintendent of Brass and Bronze Works, ornamental or architectural, is open for engagement; many years' experience in all classes of metal work. Can furnish the best of references. Practically familiar with all details. Address N., care THE METAL INDUSTRY.

SITUATION WANTED—Position as DESIGNER in Sterling Silver. Have had 15 years' experience with leading manufacturers. Understands also etching and modeling. Address DESIGNER, care THE METAL INDUSTRY.

SITUATION WANTED—PLATER, up to date in ormolu gold, silver, nickel, brass, cyanide and acid copper, verde greens, oxidizing and finishing in every class of metal. Capable of taking charge of job shop or large firm, having 20 years' experience. Wish to go West (California). Address T. H. J., care THE METAL INDUSTRY.

OPPORTUNITIES

WANTED—By a manufacturing concern, small METAL CASTINGS and NOVELTIES to make at moderate prices. For further particulars address NOVELTIES, care THE METAL INDUSTRY.

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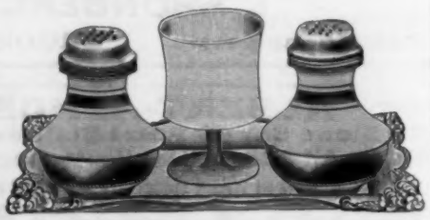

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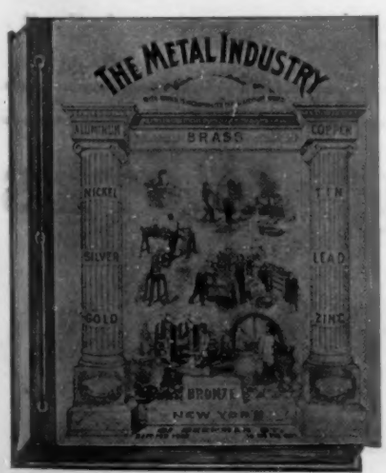

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DISSOLVES THE SAND
NO LOSS OF METAL

Tri-Sodium Phosphate

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It is always uniform, its results will surprise you—always ready and easy to apply. Your castings will be sound and you will experience no failures. It will make Phosphor Bronze without tin.

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IMPROVED

This improved product prevents the formation of pores or blowholes in castings; thereby adding to the strength and quality of the metal.

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NO TIGHTNESS OR STRINGENCY HERE

OUR BUSINESS FORECAST FOR 1908

THE "STEELE HARVEY"
CRUCIBLE BRASS MELTING FURNACE

Thanks its many users for their acquaintanceship for 1907 and trusts to be installed on "TRIAL AND APPROVAL" during 1908 to a "FOUR FOLD" extent over 1907.

PROSPECTS

Look up, look ahead! Remember profits of 1907. Don't regard temporary conditions. Be liberal. Appropriate portion of profits for modernizing Foundry Department. Your competitors may be equipped with modern Melting Furnaces. Therefore, as metals are lower in price than 1907, profit is reduced in proportion. You are therefore compelled to meet conditions by reducing cost by **50%** over COKE methods.

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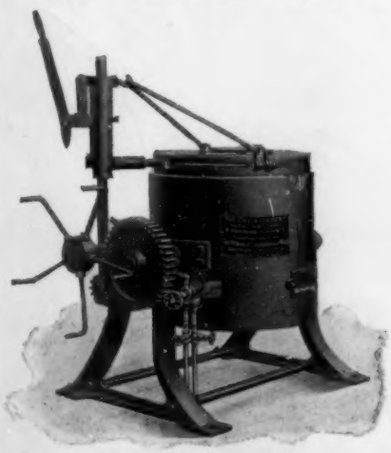
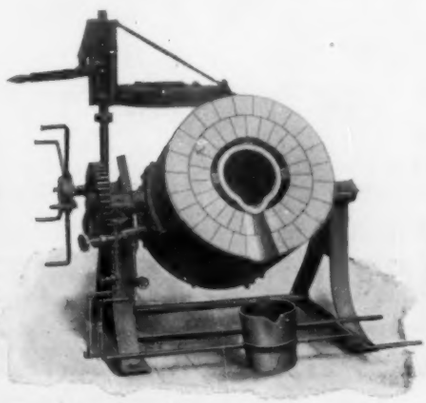
THE "STEELE-HARVEY" CRUCIBLE TILTING FURNACE
or "MONARCH" REMOVABLE CRUCIBLE FURNACE

CONDITIONS

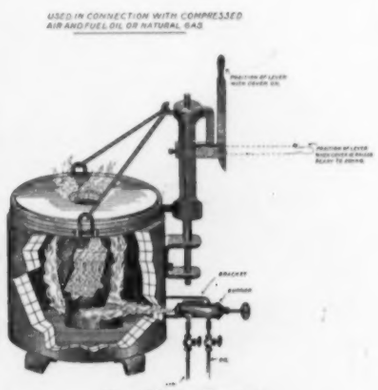
We operate with Fuel Oil, City or Natural Gas. Crucibles from Nos. 10 to 650. Capacity from 30 to 1,600 lbs. per heat. Guarantee superior quality of metal, increased life of crucibles, reduction in fuel cost, all enabling you to pay for furnace by economy effected during first year.



Melting Position.



Pouring Position.



Non-Tilting Furnace.

We send demonstrator to instruct within reasonable distance. Will enter orders for "complete equipment," quote satisfactory prices and arrange payments by check with liberal cash allowance or note settlement to your satisfaction.

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Furnaces for every purpose

Catalogues ? Sure !

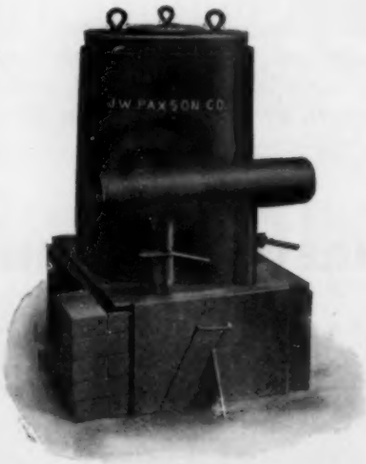

Fig. 621
Forced Draft Furnace

Fig. 622
Natural Draft Furnace
"SQUARE"

Fig. 623
Natural Draft Furnace
"ROUND"
Also made with drop-grate, and with closed bottom to be used with forced draft

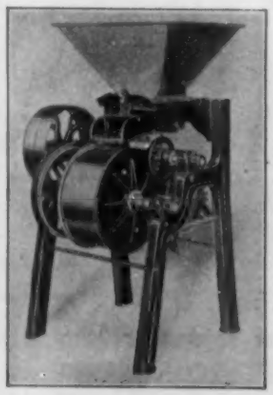

Fig. 76
The Paxson-Sawyer
Magnetic Separator

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WE ARE NOW MANUFACTURING THESE SEPARATORS FOR SEPARATING METAL TURNINGS

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J. W. PAXSON CO., PHILADELPHIA

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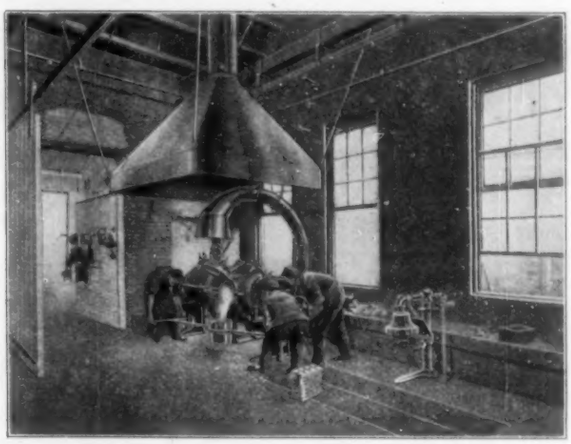

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NOTHING WASTED HERE

The most economical and unique installation devised for a brass foundry. Where other systems waste the heat after first melting, this system utilizes the heat for three operations: **FIRST** for melting the metal; **SECOND** the heat passes to other chamber and heats next charge to nearly melting point; and **THIRD** the heat is conveyed by swivel neck bent pipe to oven for baking cores. CONVENIENT, ECONOMICAL AND EFFICIENT.

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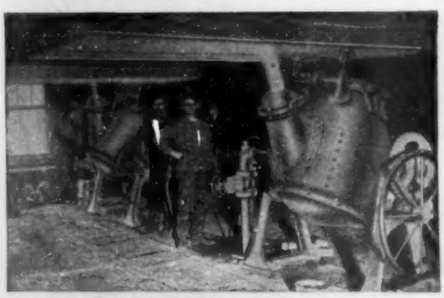

Corner of Foundry, Westinghouse Electric and Manufacturing Co., East Pittsburg, Pa., 9 Schwartz Furnaces in Operation.

Economy in Melting

The Hawley (Schwartz) furnace is, in reality, the keystone of the entire metal industry as to the design of the furnace and its availability in regard to economy in fuel consumption, economy in heat consumption, efficiency of heat utilization, and economy of metal shrinkage.

Therefore, you are able to realize the necessary conditions of practical metallurgy as experience has proved in practical work of many years.

Large, medium, and small castings can be made with facility that will meet the various physical and chemical requirements of the trade.

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Many a dollar has been lost in the foundry that could have been saved had "The Monarch" been in operation. It does absolutely and thoroughly reclaim the metal from the ashes, cinders or slag of brass furnaces. We have installed "The Monarch" in some of the leading brass foundries and smelting works, and all users advise that this machine is giving satisfaction.

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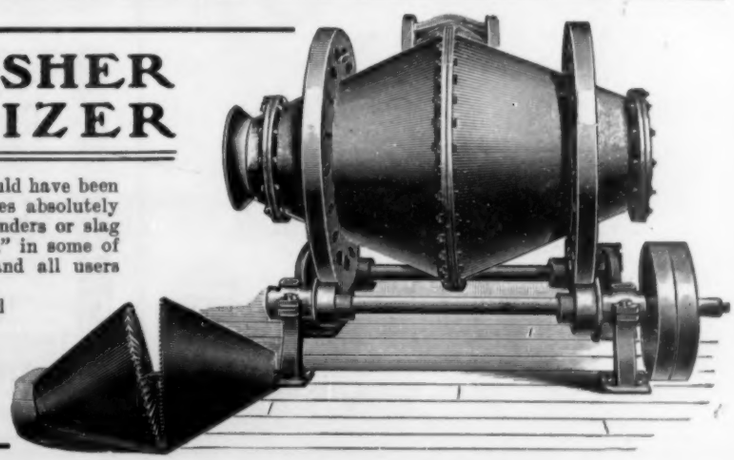

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IN SOME CASES HAS BEEN USED FIFTY TO ONE

In offering this Compound to the Brass Foundry Trade we do so with the positive assurance that it is an article that

IS SUPERIOR TO ANYTHING

being used at the present time. We can, therefore, say to you that Peerless Brass Core Compound

WILL DO YOUR WORK BETTER

than anything you may now be using—no matter what that "anything" may be.

In actual use Peerless Brass Core Compound

WILL COME OUT READILY

make better and stronger cores than Linseed Oil, and will not blow one-tenth as easily. For ordinary purposes we suggest that you use up to 35 to 1 where Sandusky or similar sand is used; and 25 to 1 where you use Sugar or Lake sand.

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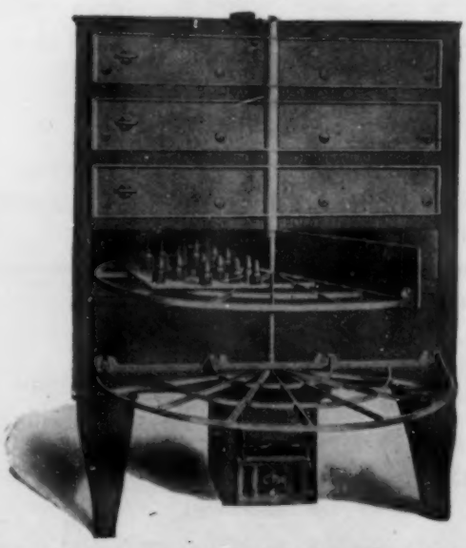

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The "OTTO" has won FIRST PRIZE at every large Exposition held in this country since the Centennial in '76.

OTTO

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Phosphor Bronze Cores

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But the quality of THE WATERBURY is higher!!

We have not tried to cheapen our product by buying cheaper grades of Plumbago, or by cutting down the weight of our Crucibles. Our Crucibles weigh more per number than any other crucible on the market. It shows that the goods are there! SEND FOR OUR CATALOG

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Why not try these superior goods

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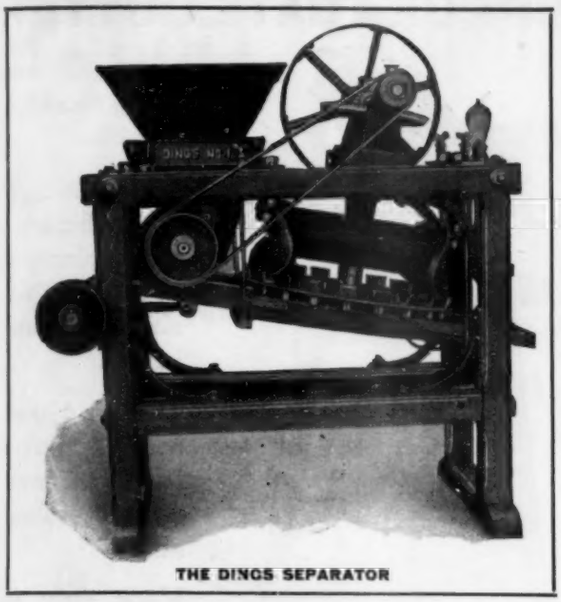

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MOST PRACTICAL, EFFICIENT AND ECONOMICAL

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THE REED MAGNETIC Metal Separator

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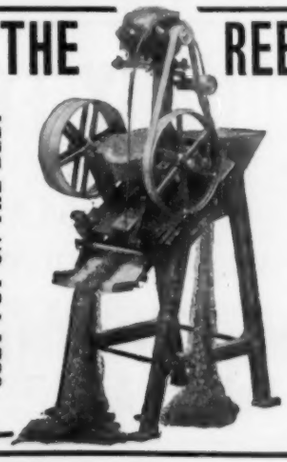

Will do more work and better work than any other.

Efficient, Simple, Cheap

Metal Separators built to meet all requirements.

Special Machinery, Dies, Metal Stamping.

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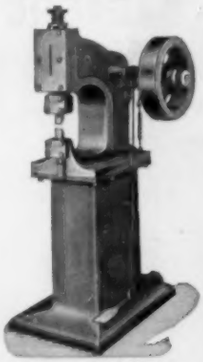

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Made only in one size.

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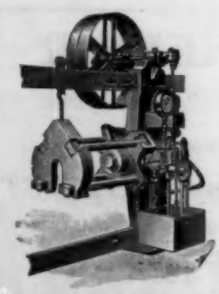

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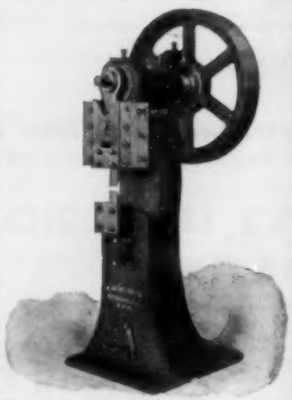

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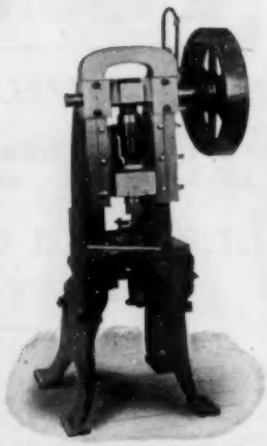

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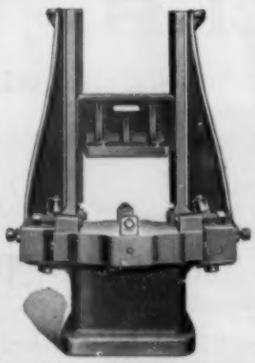

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SILVERWARE MANUFACTURERS.

This is one of our lines of drops used by SILVERSMITHS and those making a general line of stamped ware. Used in connection with the PECK AUTOMATIC DROP LIFTER it is as easily operated as are blanking presses, being tripped by foot treadle. This leaves both hands at liberty and is not fatiguing. Skilled stampers are not required to work it. Send for our catalog to see what a fine job we make of fitting up the poppets. There are other excellent features. Send for Catalog M.

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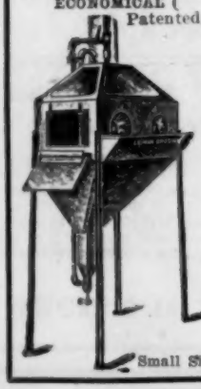
ECONOMICAL

Short, Straight Feed Pipes—CAN'T CLOG UP
Continuous Automatic Sand Feed—For RAPID WORK IN LARGE QUANTITIES

Patented



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Runs Smooth and Noiseless
Greatest Volume
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No Springs or Delicate Parts to Get Out of Order

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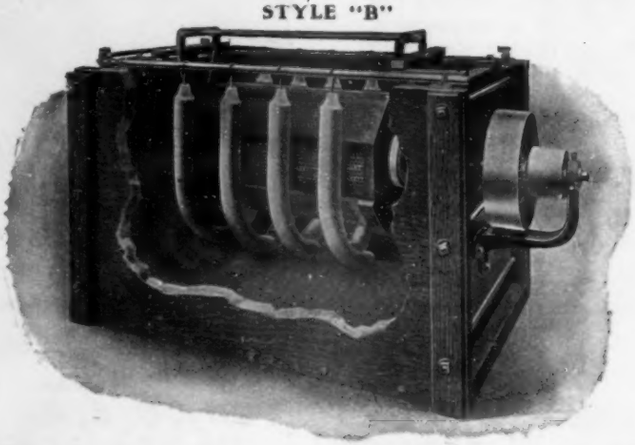
STYLE "B"



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The most efficient plating apparatus in the market. Over 500 in use by the trade

We will finish sample lots of work without charge.

This apparatus is a proved money saver where small work is to be plated. Can be used in Nickel, Copper, Brass, Zinc and Silver Solutions.

No Stringing. No Wire Used. No Metal Plating Trays or Baskets. No Unstringing. No Loss of Metal.

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Basket can be removed at will—without interfering with drive. In larger sizes basket is raised and lowered automatically.

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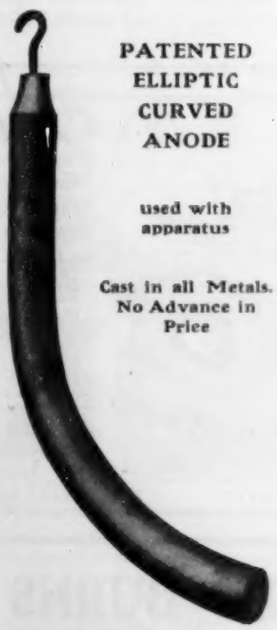

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used with apparatus

Cast in all Metals. No Advance in Price

Apparatus is Used for Electro-Galvanizing Small Articles

WE CAN FURNISH A LIST OF OVER 200 USERS OF THIS APPARATUS. MANY OF THE LARGER FIRMS ARE USING TEN OR MORE

WE HAVE MANY TESTIMONIALS INDICATING A LARGE SAVING THROUGH THE USE OF THIS APPARATUS IN PLATING SMALL WORK

Testimonial:

"The plating apparatus we have installed has proven a happy acquisition to our plating room. We send you this order for two additional apparatus."

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Branches
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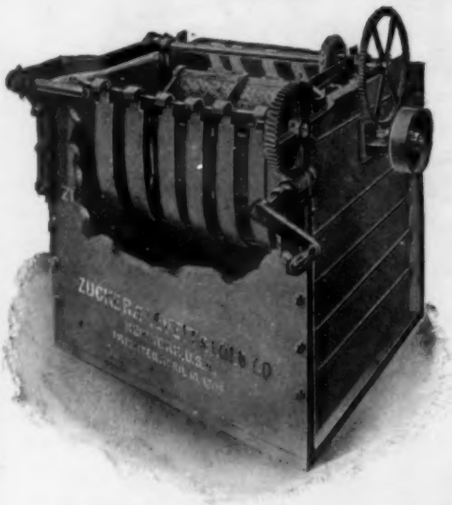
THE ROTOPLATER



Patented in U. S. and Canada, April, 1906.

Plating and Finishing at One Operation in Nickel, Copper, Zinc, Brass or Bronze.

All sorts of small work, such as nuts, bolts, screws, etc., can be economically and quickly Plated and Finished at one operation, labor of stringing also being done away with. The apparatus is fitted with a Crank and Gear by which the cylinder can be raised out of the solution to receive or discharge work. We make for this apparatus special curved anodes so that the anode surface is at all points equidistant from the work.

Patented in U. S. and Canada, April, 1906.

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Electro-galvanizing Outfits Without Royalty on Solution. Low Voltage Generators; and Direct Connected Generator Sets, 50 to 10,000 Amperes Capacity. Complete Plants Installed and All Supplies for Electro Plating and Polishing.

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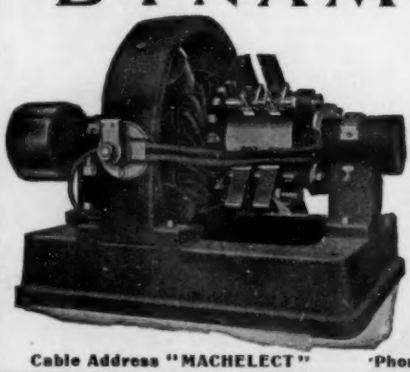

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50-8000 Amperes, 3-30 Volts.

Shunt, compound and separately excited.

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Brass and Nickel Platers' Supplies

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No. 20 Double Arbor Polishing and Buffing Lathe

Can be belted from overhead shaft or from shaft below floor

The two independent arbors permit two workmen on the same machine to be independent of each other. One may stop to change his wheel or for any other purpose, while the other continues his work. This feature contributes to a great saving of time. Built for polishing or buffing large work and is especially adapted for stove manufacturers. Each spindle is provided with tight and loose pulleys and can be run direct from main or jack shaft. The loose pulleys are one inch less in diameter than tight pulleys, which tend to relieve the strain on belt and bearings when belt is run on loose pulleys. Loose pulleys are also provided with patent oiling device which assures positive lubrication and prevents heating or binding on the shaft.

When lathe is belted from shaft below the floor, hood is provided completely covering the pulleys. Shifters are provided for each spindle to shift belt to stop or put the machine in motion.

This illustration shows the Lathe to run from overhead shaft

Bennett & O'Connell Co., Inc.

Complete Electro-Plating Outfits
Polishing and Buffing Materials
97-99-101 South Clinton Street
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Write for full description and price contained in Catalog M

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Patent Separator

V. & L. Patent Separator, Hood and Metal Saving Device

HUNDREDS OF THEM IN USE
WHY NOT BE UP-TO-DATE?

This Separator is constructed to separate the lint and dust from the air. Also can be placed next to the fan and collects material in bottom.

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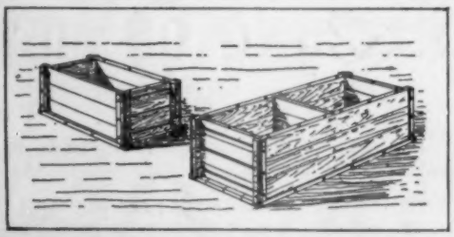
Patent Hood and Metal Saving Device

Save Money

The hood and metal saving device for polishing or grinding wheels can be attached easily to machine and saves from 5 to 20 lbs. of metal per day.

TANKS



Electro-Plating Tanks

A SPECIALTY

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THE A. T. STEARNS LUMBER CO., Neponset, Boston, Mass.

Easton Polishing Supply Co.

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Manufacturers

TURKISH EMERY	**POLISHING WHEELS**
EMERY CAKE	**PRINTERS INK BUFFS**
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Secure our prices before ordering

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It is Low Priced and Good.

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FOR TWELVE YEARS

we have been manufacturing a high-grade Acid-Proof Vitrified Non-Absorbent Brick suitable for Acid Tanks, Plating Room flooring, etc., etc.

These brick immersed in a 50% Sulphuric Acid solution for several months show no signs of deterioration.

We also have the same material pulverized to mix with Portland Cement in place of Sand in laying the Brick.

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"Geese have goose thoughts; make a swan their teacher first, then coadjutor—
Let him introduce swan notions to each noddle—
Geese will soon grow swans."
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Among other lacquers are "swan notions" among "goose thoughts." Constant imitation may convert some geese to swans, but the finisher who would buy swans, not geese, will do well to buy of

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We can satisfy anyone who is wise enough to see the value of the BEST regardless of the shade difference in the cost.

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ALL KINDS

Any width or thickness made to order on short notice and large stock always on hand.

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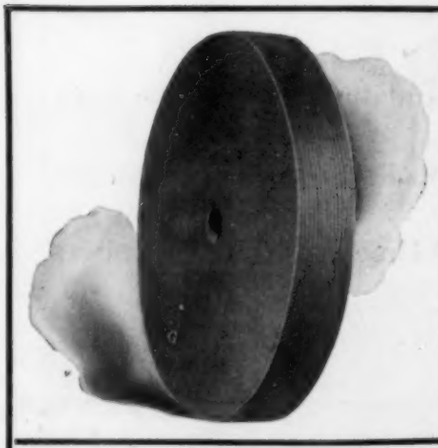

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The best composition made. Superior to anything on the market

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For Coloring Brass Goods

WHITE LILY NICKEL FINISH

For Coloring Nickel

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For oiling wheels to produce a high lustre on nickel and steel

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EMERY CAKE EMERY PASTE

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for oilwheels.

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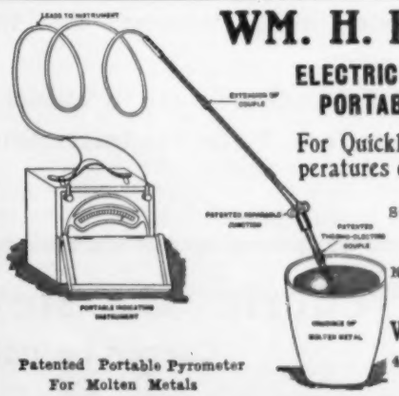

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Switchboard and Recording Models

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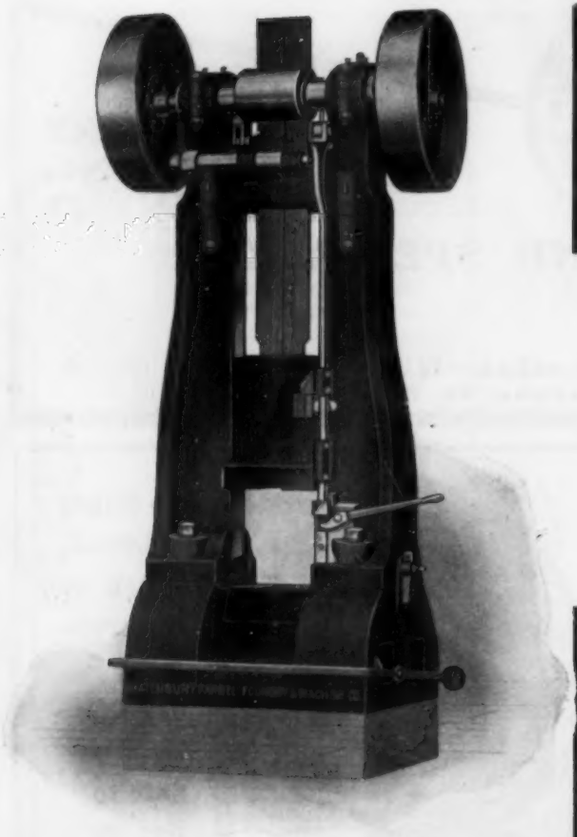

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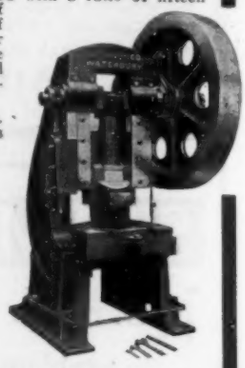

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